Cle Elum Pool Raise Project

A Component of the Yakima River Basin Integrated Water Resource Management Plan

FINAL Environmental Impact Statement

KITTITAS COUNTY, WASHINGTON

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Columbia-Cascades Area Office
Yakima, Washington

Department of Ecology
State of Washington

State of Washington
Department of Ecology
Central Regional Office
Yakima, Washington
Ecology Publication Number: 14-12-003

May 2015

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

The mission of the Department of Ecology is to protect, preserve and enhance Washington's environment, and promote the wise management of our air, land and water for the benefit of current and future generations.

United States Department of the Interior
BUREAU OF RECLAMATION
Columbia-Cascades Area Office
1917 Marsh Road
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MAY 8 2015

CCA-1123
ENV-6.00

To: Interested Individuals, Organizations, and Agencies

Subject: Cle Elum Pool Raise Project Final Environmental Impact Statement, Kittitas County, Washington

Dear Ladies and Gentlemen:

Enclosed is the Final Environmental Impact Statement (FEIS) for the Cle Elum Pool Raise Project (CEPR), prepared jointly by the Bureau of Reclamation and Washington State Department of Ecology. The CEPR is a component of the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan). This FEIS evaluates four alternatives to increase the capacity of the reservoir and improve aquatic resources for fish habitat, rearing, and migration in the Cle Elum and Yakima rivers, in addition to the No Action Alternative.

Reclamation has identified Alternative 3–Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection—as the Preferred Alternative. Under Alternative 3, Reclamation and Ecology would improve instream flows in the lower Cle Elum River and in downstream reaches of the Yakima River. This use of water complies with the Cle Elum Pool Raise Project congressional authorization in the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (108 Stat. 4550 USC), commonly referred to as YRBWEP Phase II. Alternative 3 would also employ a hybrid shoreline protection strategy.

This FEIS was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, and the State of Washington Environmental Policy Act (SEPA), Chapter 43.21C RCW, and the SEPA Rules (Chapter 197-11 WAC).

For further information regarding this document or to obtain additional copies, please contact Ms. Candace McKinley by mail at the above address, telephone (509-575-5848, ext. 232), or email (cepr@usbr.gov). In addition, the FEIS is available for viewing on the Internet at http://www.usbr.gov/pn/programs/eis/cleelumraise/index.html.

Sincerely,

For

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Enclosure

Final Environmental Impact Statement
Cle Elum Pool Raise Project
Kittitas County, Washington

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Cooperating Governments and Agencies:

Confederated Tribes and Bands of the Yakama Nation
U.S. Department of Agriculture, U.S. Forest Service
U.S. Department of Energy, Bonneville Power Administration
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service

This Final Environmental Impact Statement (FEIS) for the Cle Elum Pool Raise Project was prepared jointly by the U.S. Department of the Interior Bureau of Reclamation and Washington State Department of Ecology. Reclamation and Ecology are proposing this project as part of implementation of the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan). This FEIS evaluates a No Action Alternative and four action alternatives: Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection; Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection; Alternative 4 – Additional Storage Capacity for Total Water Supply Available (TWSA) with Rock Shoreline Protection; and Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection. Reclamation and Ecology have identified Alternative – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection as the Preferred Alternative.

This FEIS was prepared in compliance with the National Environmental Policy Act (NEPA) 42 USC 4371 et seq. and the State of Washington Environmental Policy Act (SEPA), Chapter 43.21C RCW, and the SEPA Rules (Chapter 197-11 WAC).

SEPA FACT SHEET

Brief Description of Proposal:

Reclamation and the Washington State Department of Ecology have jointly prepared this Final Environmental Impact Statement (FEIS) on the Cle Elum Pool Raise Project. This document was prepared in compliance with the National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA). Ecology is the SEPA lead agency for the proposal.

The Cle Elum Pool Raise Project would allow up to an additional 14,600 acre-feet of water to be stored and released from Cle Elum Reservoir by modifying the existing spillway radial gates at Cle Elum Dam. Reclamation and Ecology developed the project in response to congressional legislation (Title XII) and the project is an element of the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan).

Proponents and Contacts:

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Permits, Licenses, and Approvals Required for Proposal:

To implement any component of the action alternative, the lead agencies would need to apply for any required permits and comply with various laws, regulations, and Executive Orders. The following are those that are likely to apply:

- National Environmental Policy Act
- Endangered Species Act
- Magnusson-Stevens Fishery Conservation and Management Act
- Fish and Wildlife Coordination Act
- Secretary's Native American Trust Responsibilities
- National Historic Preservation Act
- Native American Graves Protection and Repatriation Act
- Executive Order 11988: Floodplain Management
- Executive Order 11990: Protection of Wetlands
- Executive Order 12898: Environmental Justice
- Executive Order 13007: Indian Sacred Sites
- Executive Order 13175: Consultation and Coordination with Indian Tribal Governments
- Clean Water Act
- State Environmental Policy Act
- Dam Safety Permit
- Hydraulic Project Approval

Additionally, Reclamation and Ecology would coordinate with Kittitas County on the applicability of local regulations, including critical areas regulations and the Shoreline Management Program.

Authors and Contributors:

A list of authors and contributors is provided in a section that follows Chapter 5 and the Comment and Response Section.

Date of Issue:

May 15, 2015

Public Comment on the Draft Environmental Impact Statement:

In accordance with WAC 197-11-455, Ecology and Reclamation conducted a public comment period from September 23, 2014 to November 25, 2014. A total of 21 comment letters were received from agencies and individuals.

Changes from the Draft Environmental Impact Statement:

Section 1.12 of the FEIS lists changes made to the FEIS since publication of the Draft Environmental Impact Statement.

Timing of Additional Environmental Review:

Reclamation will issue the Record of Decision on the Cle Elum Pool Raise no earlier than 30 days after the release of this FEIS. As noted in the FEIS, if there are changes in the project that could result in adverse impacts that are not identified in this FEIS, Reclamation and Ecology would conduct the appropriate environmental review and complied to identify and address potential significant adverse effects prior to taking action.

Document Availability:

The FEIS can be viewed online at: http://www.usbr.gov/pn/programs/eis/cleelumraise/index.html. The document may be obtained in hard copy or CD by written request to the SEPA Responsible Official listed above, or by calling 509-575-5848, ext. 613. To ask about the availability of this document in a format for the visually impaired, call the Office of Columbia River at 509-662-0516. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Location of Background Materials:

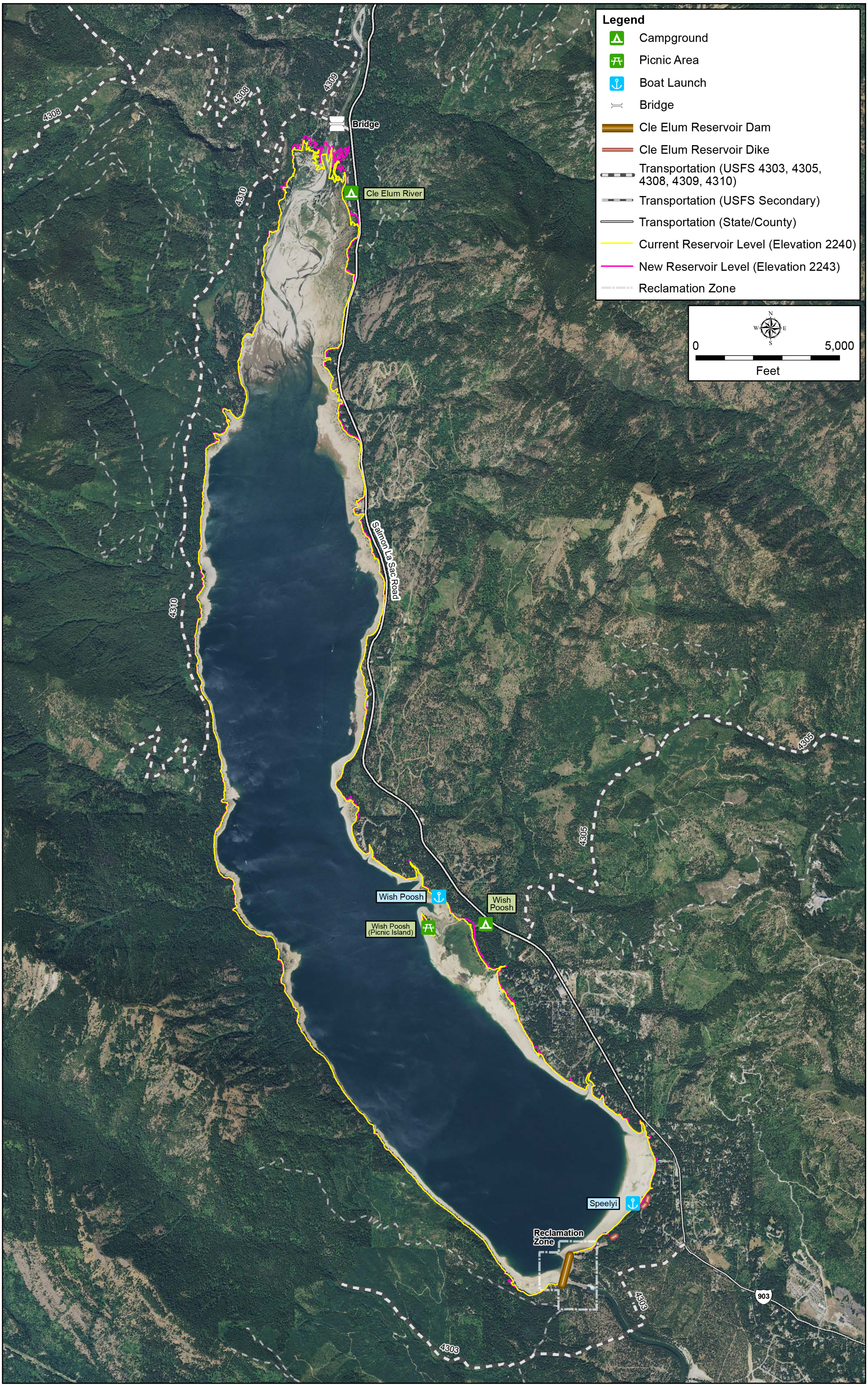
Background materials used in the preparation of this FEIS are available online at:

Cle Elum Pool Raise Project

http://www.usbr.gov/pn/programs/eis/cleelumraise/index.html

Additional information about the Yakima River Basin Integrated Water Resource Management Plan is available at:

http://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html.



Legend
Campground
Picnic Area
Boat Launch
Bridge
Cle Elum Reservoir Dam
Cle Elum Reservoir Dike
Transportation (USFS 4303, 4305, 4308, 4309, 4310)
Transportation (USFS Secondary)
Transportation (State/County)
Current Reservoir Level (Elevation 2240)
New Reservoir Level (Elevation 2243)
Reclamation Zone
0
5,000
Feet
Bridge
Cle Elum River
4308
4309
4310
Salmon La Sac Road
4305
Wish Poosh
Wish Poosh (Picnic Island)
Speelyi
Reclamation Zone
4303
903

ACRONYMS AND ABBREVIATIONS

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$\mu g/m^3$	microgram per cubic meter
AASHTO	American Association of State Highway and Transportation Officials
APE	Area of Potential Effects
ADT	average daily traffic
bgs	below ground surface
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMPs	best management practices
BPA	Bonneville Power Administration
C	Celsius
CAA	Clean Air Act
CAO	Critical Areas Ordinance
CAR	Coordination Act Report
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CIG	Climate Impact Group
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Colville Tribes	Confederated Tribes of the Colville Reservation
Corps	U.S. Army Corps of Engineers
CRMP	Cultural Resources Management Plan
CSA	Conservation Support Area
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act

CY	cubic yards
DAHP	Department of Archaeology and Historic Preservation
dB	decibels
dBA	A-weighted decibels
DEIS	Draft Environmental Impact Statement
DNR	Department of Natural Resources
DO	dissolved oxygen
DOI	Department of the Interior
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EDNA	Environmental Designation for Noise Abatement
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FEIS	Final Environmental Impact Statement
FR	Federal Register
ft	feet
FWCA	Fish and Wildlife Coordination Act
GHG	greenhouse gas
GLO	General Land Office
H-to-V	horizontal-to-vertical
I-	Interstate
IMPLAN	Impact Analysis for PLANning model
in/sec	inches per second
Integrated Plan	Yakima River Basin Integrated Water Resource Management Plan
Integrated Plan PEIS	*Yakima River Basin Integrated Water Resource Management Plan Final Programmatic Environmental Impact Statement*

IO	input-output
ITA	Indian Trust Asset
KDRPP	Kachess Drought Relief Pumping Plant project
kg/gal	kilograms per gallon
KKC	Keechelus to Kachess Conveyance project
kV	kilovolt
kW	kilowatt
LiDAR	Light Detection and Ranging
L_{max}	average maximum noise level
Master Agreement	*1987 Master Interagency Agreement*
MCR	Middle Columbia River
mg/L	milligrams per liter
Milestone	Water Supply Facility Permit and Funding Milestone
MOCA	Managed Owl Conservation Area
MSAT	mobile source air toxics
MUTCD	Manual of Uniform Traffic Control Devices
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NF	National Forest road
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_X	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTU	nephelometric turbidity units

NWI	National Wetland Inventory
O_3	ozone
OHV	off-highway vehicle
OHWM	ordinary high water mark
O&M	operations and maintenance
OSS	on-site sewer systems
Pb	lead
PEIS	Programmatic Environmental Impact Statement
PHS	Priority Habitats and Species
PIT	Passive Integrated Transponders
PM	particulate matter
PM2.5	particulate matter less than 2.5 microns
PM10	particulate matter less than 10 microns
ppm	parts per million
PPV	peak particle velocity
PSD	Prevention of Significant Deterioration
PUD	Public Utility District
RCW	Revised Code of Washington
Reclamation	Bureau of Reclamation
SEPA	State Environmental Policy Act
Service	U.S. Fish and Wildlife Service
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMA	Shoreline Management Act
SMP	Shoreline Master Program
SO_2	sulfur dioxide
SOAC	System Operations Advisory Committee
SPAMA	Snoqualmie Pass Adaptive Management Area
SR	State Route

TCF	Teanaway Community Forest
TCP	Traditional Cultural Properties
TDG	total dissolved gases
TMDL	total maximum daily load
TOC	total organic carbon
TWSA	total water supply available
USC	U.S. Code
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
VdB	vibration decibel
VMS	Visual Management Systems
VQO	Visual Quality Objective
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation
YRBWEP	Yakima River Basin Water Enhancement Project

Contents

Tables

Figures

Photos

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Introduction

The U.S. Department of the Interior Bureau of Reclamation and the Washington State Department of Ecology have prepared this Final Environmental Impact Statement (FEIS) on the Cle Elum Pool Raise Project. Reclamation and Ecology are jointly leading and preparing this FEIS as a combined National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) document. The Yakama Nation, U.S. Forest Service (USFS), Bonneville Power Administration (BPA), and National Marine Fisheries Service (NMFS) are serving as cooperating agencies in preparation of the FEIS.

The Cle Elum Pool Raise Project would allow up to an additional 14,600 acre-feet of water to be stored and released from Cle Elum Reservoir by modifying the existing spillway radial gates at Cle Elum Dam. The project was authorized by Congress in the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP) (108 Stat. 4550 USC). It is also a component of the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan).

Purpose and Need for the Action

Congress enacted the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434), which included Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP) (108 Stat. 4550 U.S. Code [USC]). Sections 1205 and 1206 provide authorization for the Cle Elum Pool Raise Project. This project includes modifying the radial gates at Cle Elum Dam to provide an additional 14,600 acre-feet of storage capacity in Cle Elum Reservoir; providing for shoreline protection of Cle Elum Reservoir; accomplishing necessary environmental mitigation; and dedicating the accrued water to instream flows.

To advance its mission within the Yakima Project, Reclamation prepared the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan) Programmatic EIS (PEIS) to develop a comprehensive program of water resource and habitat improvements focused on fish passage, aquatic habitat, and water supply. The Integrated Plan PEIS confirmed that the current water resources infrastructure, programs, and policies in the Yakima River basin are not capable of consistently meeting the demands for fish and wildlife, irrigation, and municipal water supply (Reclamation and Ecology, 2012). The purpose of the Proposed Action is to increase the capacity of Cle Elum Reservoir and improve aquatic resources for fish habitat below Cle Elum Dam.

Yakima River Basin Integrated Water Resource Management Plan

Reclamation and Ecology developed the Integrated Plan to meet the future water needs of the Yakima River basin. Based on over 30 years of studies in the basin, the agencies determined that current water supply in the basin does not meet instream or out-of-stream demand, including the aquatic demands for fish and wildlife and the out-of-stream needs of irrigation and municipal supply. In addition, climate change predictions indicate that the basin's snowpack will decrease, reducing spring and summer runoff.

The Integrated Plan addresses the need to restore ecological functions in the Yakima River basin and to provide more reliable and sustainable water resources for the health of the riverine environment, as well as agriculture, municipal, and domestic water users. The Integrated Plan meets these needs while anticipating changing water uses and effects of predicted climate change on water resources in the basin (Reclamation and Ecology, 2012).

The goals of the Integrated Plan are as follows:

- Provide opportunities for comprehensive watershed protection, ecological restoration and enhancement addressing instream flows, aquatic habitat, and fish passage
- Improve water supply reliability during drought years for agricultural and municipal needs
- Develop a comprehensive approach for efficient management of water supplies for irrigated agriculture, municipal and domestic uses, and power generation
- Improve the ability of water managers to respond and adapt to potential effects of climate change
- Contribute to the vitality of the regional economy and sustain the riverine environment.

To address these goals, the Integrated Plan includes seven elements: reservoir fish passage, structural and operational changes to existing facilities, surface water storage, groundwater storage, habitat and watershed protection and enhancement, enhanced water conservation, and market reallocation. The seven elements each include recommended projects to meet the goals. The structural and operational changes element includes the Cle Elum Pool Raise Project. The project would help meet the goal of enhancing instream flows, which would benefit fish habitat.

Alternatives

This FEIS evaluates the potential environmental impacts associated with the Cle Elum Pool Raise Project. The Cle Elum Pool Raise Project would modify the existing radial gates at the dam spillway to raise the level of the reservoir pool 3 feet, allowing up to an additional 14,600 acre-feet of water to be stored and released from Cle Elum Reservoir. The existing dam would remain as is.

In addition to the No Action Alternative, Reclamation and Ecology are evaluating four action alternatives for the Cle Elum Pool Raise Project. All four action alternatives would include the same approach to raising the reservoir pool level by modifying the existing spillway radial gates.

Reclamation and Ecology are proposing the following two alternatives for allocating and using the additional storage capacity:

- For instream flow, as authorized in the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP) (108 Stat. 4550 USC) to improve conditions for fish
- For total water supply available (TWSA) and out-of-stream uses as well as instream flows, requiring additional congressional authorization

Reclamation and Ecology are also proposing the following two strategies for shoreline protection:

- Rock shoreline protection, consisting mostly of riprap with some plantings
- Hybrid shoreline protection, consisting of a range of treatments, including rock riprap and various bioengineered techniques

Under both shoreline protection alternatives, Reclamation would continue its existing shoreline monitoring and maintenance program. Both forms of shoreline protection may require Reclamation to acquire private land or easements across private land from willing sellers.

Preferred Alternative

Reclamation and Ecology have identified Alternative 3 – Additional Storage Capacity Used for Instream Flow with Hybrid Shoreline Protection (described below) as the Preferred Alternative. Alternative 3 meets the purpose and need of the Proposed Action to increase the capacity of Cle Elum Reservoir and improve aquatic resources for fish habitat below Cle Elum Dam. Hybrid shoreline protection would prevent erosion while reducing environmental impacts in shoreline areas.

Alternative 1 – No Action Alternative

Alternative 1, the No Action Alternative, represents the most likely future conditions in the absence of implementing the proposed action. The No Action Alternative forms the baseline for comparison of potential impacts from the proposed action and the action alternatives. Under the No Action Alternative, Reclamation and Ecology would not implement the Cle Elum Pool Raise Project and additional storage capacity would not be available in the reservoir.

For purposes of this FEIS, Reclamation and Ecology consider the No Action Alternative to include the following projects and actions:

- Interim juvenile fish passage facility and operations currently in place at Cle Elum Dam, including reconstruction of the facilities
- Ongoing fish reintroduction at Cle Elum Reservoir and upper Cle Elum River

- Construction and operation of permanent fish passage facilities at Cle Elum Dam
- Two ongoing conservation projects being implemented under the Yakima River Basin Water Enhancement Project (YRBWEP) Phase II water conservation, and land and water rights acquisition program

Proposed Action (Alternative 2) – Additional Stored Water Used for Instream Flow with Rock Shoreline Protection

Under Alternative 2, Reclamation would increase the Cle Elum Reservoir pool level by 3 feet, allowing an additional 14,600 acre-feet of water to be stored in the reservoir. Reclamation would allocate the additional storage capacity to meet instream flow needs as authorized in the Title XII legislation (108 Stat. 4526 USC). Reclamation would implement a rock shoreline protection strategy to reduce the potential for increased shoreline erosion from the higher reservoir level.

Alternative 2 includes the following major components:

- Modify the existing Cle Elum Dam spillway radial gates to increase the reservoir capacity by 14,600 acre-feet, resulting in inundation of some shoreline areas not currently inundated
- Dedicate the accrued water to instream flows
- Install rock shoreline protection to stabilize shorelines adjacent to private property subject to increased erosion from the higher reservoir pool
- Monitor shoreline conditions and implement appropriate protection measures where necessary in conjunction with Reclamation's existing annual shoreline monitoring assessment
- Raise the elevation of three existing earthen saddle dikes north and east of the dam and raise the height of the right abutment of the dam to provide adequate freeboard[1]
- Provide shoreline protection for Federal property, including UUSFS recreational facilities and access at Speelyi Beach Boat Launch and Day Use Area, Wish Poosh Campground and Boat Launch, Cle Elum River Campground, and portions of the west shoreline
- Provide erosion protection for portions of Salmon La Sac Road
- Acquire land, easements, or both from willing private sellers where necessary to accommodate shoreline protection
- Improve aquatic habitat at the mouths of three perennial streams on Federal lands along the west shore of Cle Elum Reservoir

[1] Freeboard is a factor of safety usually expressed in feet above a flood level. In this case, it is a 3-foot zone of additional protection from wave erosion.

Alternative 3 – Additional Stored Water Used for Instream Flow with Hybrid Shoreline Protection (Preferred Alternative)

Under Alternative 3, Reclamation and Ecology propose to use the additional storage capacity for instream flows as described for Alternative 2, but Reclamation would employ a hybrid shoreline protection strategy. Reclamation would protect shorelines using rock walls where needed combined with bioengineered shoreline protection, such as perched beaches, anchored logs, and other techniques. All other project components would be the same as described for Alternative 2.

Alternative 4 – Additional Stored Water Used for TWSA with Rock Shoreline Protection

Under Alternative 4, Reclamation and Ecology propose to use the additional storage capacity for TWSA to provide water supply for irrigation districts or for instream flows. This alternative would require additional authorization from Congress. Reclamation would employ the same rock shoreline protection strategy described for Alternative 2. All other project components would be the same as Alternative 2.

Alternative 5 – Additional Stored Water Used for TWSA with Hybrid Shoreline Protection

For Alternative 5, Reclamation and Ecology propose to use the additional storage capacity for TWSA as described for Alternative 4, but would employ the hybrid shoreline protection strategy as described for Alternative 3. All other project components would be the same as described for Alternative 2.

Summary of Environmental Consequences

Chapter 4 of the FEIS describes the environmental consequences of the alternatives, including the No Action Alternative. The Cle Elum Pool Raise Project would provide additional stored water to benefit streamflows and fish or water supply. Under Alternatives 2 and 3, the additional storage would be used for either increasing the pool level for downstream outmigrants in spring or to improve instream flow in the Cle Elum and Yakima rivers during winter, spring or summer. The scenarios for use of the additional storage would have significant benefits on reservoir elevation and streamflow in the Cle Elum and Yakima rivers. The improved streamflows and reservoir levels under Alternatives 2 and 3 would provide significant benefits to fish species in the Yakima River basin, including bull trout and steelhead, which are listed as threatened under the Endangered Species Act (ESA). Under Alternatives 4 and 5, prorationing levels during drought years would rise by a maximum of 1.6 percent. This represents a minor significant benefit to water users.

Under all action alternatives, the additional stored water would inundate approximately 46 additional acres around the reservoir. The additional inundation would occur for about 40 days in June and July in years when water is available to fill the reservoir. Some losses to vegetation would occur and areas of coniferous forest would likely be replaced by more flood-tolerant species such as deciduous tree/shrub communities. Reclamation expects impacts to vegetation and wildlife habitat to be minor because of the limited duration and scale of the inundation. No significant impacts to ESA-listed terrestrial species would occur.

The increased inundation would increase erosion along some of the shoreline. All action alternatives include shoreline protection to reduce this erosion and to protect private property and Federal facilities. However, Reclamation expects approximately 2 to 5 acres of area could erode in addition to the current levels of erosion. Reclamation would continue its annual inspection of shoreline conditions to identify erosion problems and approaches to address the problems. All action alternatives would cause temporary short-term impacts to recreation during construction but would protect recreational facilities along the reservoir, so Reclamation anticipates no significant long-term impacts to developed recreation facilities. Some portions of dispersed recreation areas would be displaced during the period of higher reservoir level, but impacts would not be permanent and other dispersed recreation opportunities would be available nearby.

Under all action alternatives, modification of the radial spillway gates would alter the historic Cle Elum Dam and the increased reservoir pool would impact archaeological resources along the shoreline. Reclamation would develop and implement a treatment plan for cultural resources directly affected by the project and a Cultural Resource Management Plan to address ongoing and future operational and land management implications of the project.

Most impacts associated with the Cle Elum Pool Raise Project would be temporary construction impacts such as increased noise, dust, and traffic. These construction activities would also temporarily affect visual quality and the recreational experience around the reservoir. Construction would require clearing and grading of some areas. Reclamation would restore most of the disturbed areas with native vegetation following construction. Reclamation expects all construction impacts to be minor. Construction would occur in phases over a 5 year period, reducing the number of truck trips, vehicle emissions, and area disturbed during any one construction year. Reclamation would conduct all shoreline construction activities above the water line while the reservoir is drawn down, so no impacts to fish would occur.

Table ES-1 provides a summary of impacts and benefits associated with the No Action and four action alternatives.

Table ES-1. Summary Comparison of Impacts

Surface Water			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No additional storage capacity would be available in Cle Elum Reservoir. Water supplies for proratable irrigators would continue to fall below 70 percent of entitlement during drought years. Instream flow conditions in the Cle Elum and Yakima rivers would not change.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Inundation of 46 additional acres of shoreline for an average of 39 days per year • Reservoir would reach full pool in 52 percent of years	• Additional storage would either increase the pool level for downstream outmigrants in spring or improve instream flow in the Cle Elum and Yakima rivers during winter, spring, or summer, providing significant benefits	• No impact on reservoir storage or releases
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	• Same as Alternative 2, except there would be an average of 40 days of additional inundation and the reservoir would reach full pool in 53 percent of years	• Additional storage would increase prorationing levels during drought years by a maximum of 1.6 percent, providing a minor significant benefit	Same as Alternative 2
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 4	Same as Alternative 4	Same as Alternative 3

Earth			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Shoreline erosion would continue as it does under existing conditions		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Increase in shoreline erosion where no shoreline protection is installed	• No change in potential for increased erosion downstream in the Cle Elum or Yakima rivers	• Short-term increase in erosion during construction
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Surface Water Quality			
Alternative	Spillway Radial Gate Modifications to Raise the Reservoir Level	Use of Additional Storage Capacity	Shoreline Protection
Alternative 1 – No Action	Existing water quality trends would continue. Construction projects could cause temporary water quality impacts		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Construction would cause minor short-term increases in sediments, turbidity and nutrients, which would be minimized by best management practices • Project actions would not affect water quality conditions in Cle Elum Reservoir or in downstream reaches of the Cle Elum and Yakima rivers		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Groundwater			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction of projects included under the No Action Alternative would have no impacts on groundwater quality, water levels, or on-site septic systems (OSS) in the Cle Elum Reservoir area		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• No negative effects on water wells or groundwater levels are expected • Temporary higher groundwater levels could cause some OSS to fall out of compliance with county requirements	• No negative effects are anticipated	• Inadvertent spills during construction could decrease groundwater quality
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Fish			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Existing low-flow conditions would continue to negatively impact fish in the Cle Elum and Yakima rivers. Completion of permanent fish passage facilities at Cle Elum Dam would benefit fish by restoring ecological connectivity, biodiversity, and natural production of anadromous salmonids in the Cle Elum watershed above Cle Elum Dam		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• The increased reservoir level would temporarily increase erosion caused turbidity which would negatively impact fish • Erosion could increase nutrients in the reservoir, which would cause minor short-term increases in productivity and benefit fish • Inundation of shoreline vegetation would cause a short-term increase in habitat complexity that would benefit reservoir fish species by providing additional in-water structure	One of five instream flow scenarios would be implemented, each of which would have positive impacts on fish: • Scenario 1 would provide flow and habitat complexity improvements for salmonids • Scenario 2 would improve flow conditions during the smolt outmigration period • Scenario 3 would improve habitat connectivity for returning adult spawners • Scenario 4 would improve habitat connectivity for outmigrating juvenile salmonids • Scenario 5 would combine the benefits of Scenarios 2 through 4	• Construction would occur above the level where fish would be present and would not impact fish • Completed shoreline protection would not impact fish

Fish			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2 • A more natural riparian area would develop with hybrid shoreline protection, providing minor benefits to fish habitat
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2	• Existing low flows that currently impact fish in the Yakima and Cle Elum Rivers would continue	Same as Alternative 2
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 4	Same as Alternative 3

Vegetation and Wetlands			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction projects would not result in significant impacts on wetlands or vegetation. Ongoing trends in land management would continue to affect vegetation		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Inundation from the higher reservoir pool may impact wetlands and USFS Survey and Manage and other special status plant species, but no significant impacts are anticipated	• Use of additional storage capacity would not cause significant impacts on wetlands and vegetation downstream along the Cle Elum or Yakima rivers	• Construction and operation activities would result in insignificant impacts on wetlands and vegetation
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2, but the construction footprint would be slightly larger so impacts on wetlands and shoreline vegetation would be greater • A more natural riparian area would develop on hybrid shoreline protection
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	Same as Alternative 3

Wildlife			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Patterns and trends of wildlife habitat that currently occur would continue. Fish passage projects at Cle Elum Reservoir would generate noise that would affect wildlife during construction but would ultimately benefit wildlife because of the new influx of nutrients from anadromous salmon carcasses.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Construction would result in minor short-term disturbance to wildlife • Operations would inundate a small amount of shoreline habitat (3 percent) that is not affected by current reservoir operations, the impact on priority species would not be significant	• Impacts to wildlife would not occur because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• Construction would cause a minor, short-term disturbance to wildlife • Shoreline protection projects would result in the loss of a narrow strip of habitat along the shoreline of the reservoir, but the loss would not impact the breeding, rearing, or foraging activities of priority species
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2 • Hybrid protection would create a more natural shoreline habitat
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	Same as Alternative 3

Threatened and Endangered Species			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Current trends would continue, which could result in detrimental long-term impacts to listed species. Completion of the fish passage facilities at Cle Elum Dam would benefit listed fish and terrestrial species.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• The increased reservoir level would temporarily increase erosion caused turbidity which would negatively impact bull trout • Erosion could increase nutrients in the reservoir, which would cause minor short-term increases in productivity and benefit bull trout • Inundation of shoreline vegetation would cause a short-term increase in habitat complexity that would benefit bull trout by providing additional in-water structure • Any habitat loss for northern spotted owl caused by the increased inundation would be offset by measures Reclamation will take to prevent further recreational dispersal and to restore Federal lands on the west side of the reservoir	• Increased instream flows would benefit bull trout and MCR steelhead downstream from Cle Elum Dam	• Construction could cause short-term disturbance of bull trout and northern spotted owl if present near the work area. • No long-term impacts are anticipated
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2 • Hybrid shoreline protection would create a more natural shoreline habitat

Threatened and Endangered Species			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2	• Timing of flows released for TWSA would cause a negative impact on listed salmonids in the Yakima and Cle Elum rivers	Same as Alternative 2
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 4	Same as Alternative 3

Visual Quality			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Permanent fish passage facilities would be visible upstream of the dam, but would remain visually consistent with the overall setting		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Construction activities and equipment would cause short-term visual quality impacts • Dam modifications, shoreline protection, and reservoir pool changes would cause localized visual quality impacts that would not substantially contrast with the existing visual quality setting		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Hybrid shoreline protection would create a more natural appearing shoreline
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 3		

<table>
<tr><th colspan="4">Air Quality</th></tr>
<tr><th>Alternative</th><th>Spillway Radial Gate Modifications to Raise the Reservoir Level</th><th>Use of Additional Storage Capacity</th><th>Shoreline Protection</th></tr>
<tr><td>Alternative 1 – No Action</td><td colspan="3">Construction would generate localized and short-term emissions but no exceedance of thresholds is anticipated</td></tr>
<tr><td>Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection</td><td colspan="3">Minor emissions from construction would occur, but they would not violate any air quality standards or result in any air quality impacts</td></tr>
<tr><td>Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection</td><td colspan="3">Same as Alternative 2</td></tr>
<tr><td>Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection</td><td colspan="3">Same as Alternative 2</td></tr>
<tr><td>Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection</td><td colspan="3">Same as Alternative 2</td></tr>
</table>

Climate Change			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Projects constructed under the No Action Alternative would generate carbon emissions that would fall below Ecology's significance level. Completed fish passage facilities would improve conditions for salmonids under climate change conditions. Reduced flexibility for Reclamation to adapt water management in response to climate change.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Carbon emissions would fall below Ecology's significance level • Changes in runoff timing and volume associated with climate change would adversely impact the project by reducing the number of years the additional storage capacity would be available • Additional storage capacity would allow water managers somewhat more flexibility to respond to climate change • Positive benefit in instream flow or reservoir levels		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	• Carbon emissions would fall below Ecology's significance level • Changes in runoff timing and volume associated with climate change would adversely impact the project by reducing the number of years the additional storage capacity would be available • Additional storage capacity would allow water managers somewhat more flexibility to respond to climate change • Negligible benefit to prorationed irrigators		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 4		

Noise and Vibration			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction activities would cause minor increases in noise		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Minor, temporary increases in noise and vibration during construction • No long-term noise impacts		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Recreation			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Projects included in the No Action Alternative would not result in adverse impacts on recreation. Ongoing dispersed camping and day use activities would continue to cause substantial degradation of the terrestrial, nearshore, and aquatic environments.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Dispersed recreation areas at Dry, Morgan, and French Cabin creeks would be inundated for approximately 40 days in years when additional storage capacity is used. Dispersed camping would be available in other areas around the reservoir • Opportunities to launch small watercraft downstream from the NF-4308 bridge would be reduced by inundation, but other boat launch locations would remain available • Installation of guardrails, proposed as mitigation for the impacts of dispersed camping, would permanently block vehicle-oriented dispersed recreation at the Dry Creek and French Cabin Creek areas, but recreationists would be able to walk into these areas and vehicle-oriented dispersed recreation would still be allowed in other areas	• A small increase in instream flows in the Cle Elum and Yakima rivers would not affect recreation because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• Installation of shoreline protection measures on private property could make access to shoreline more difficult. Reclamation would work with property owners to provide appropriate mitigation to the extent possible
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		

Recreation			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Land and Shoreline Use			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	The No Action Alternative would not impact land use.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• An additional 43 acres of Federal land and 3 acres of private property would be inundated; structures would not be affected • Additional inundation of the Cle Elum River where it enters the reservoir could affect designation of this portion of the river as a Wild and Scenic River	• Variations in instream flows would not affect land use because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• The acquisition of approximately 20 acres of land in narrow strips adjacent to the shoreline would not make private properties unsuitable for existing uses • Reclamation would acquire land only from willing sellers
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		

Land and Shoreline Use			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Utilities			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Permanent fish passage facilities would require a minor, insignificant increase in electricity use		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Reclamation would remove vault toilets at Speelyi Beach and Wish Poosh and Cle Elum River campgrounds and replace them with new vault toilets or portable toilets in a new location in coordination with the USFS • Reclamation would permanently remove the water and electrical services to Picnic Island and the boat launch area at Wish Poosh Campground in coordination with the USFS • No other utility interruptions are anticipated during construction		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Transportation			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	The No Action Alternative would not result in a notable increase in traffic levels		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Increases in construction vehicle traffic would be temporary and negligible • No roads or bridges would be inundated	• Fluctuations in flows downstream in the Cle Elum and Yakima rivers would not affect transportation infrastructure because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• Increases in construction vehicle traffic would be temporary and negligible. • Lake Cabins Road would be closed for a period of less than 2 weeks. Alternative routes would be available. • Construction to increase shoreline protection on Salmon La Sac Road would temporary restrict traffic to one lane, but access would be maintained.
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Socioeconomics			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction of projects included in the No Action Alternative would result in minor direct increases in local employment. Prevailing economic factors would continue		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	The Proposed Action would result in a gain in regional economic activity. Construction would increase output in the short term. None of the impacts would be significant.		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Similar to Alternative 2, and use of additional storage capacity for TWSA would increase agricultural production and market value during severe drought years		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 4		

Cultural Resources			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction of new permanent fish passage facilities would have an adverse effect on NRHP-eligible resources.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Modifications to the spillway radial gates would constitute a significant change to a historic structure (Cle Elum Dam) • The increased reservoir pool and associated shoreline protection measures would impact archaeological resources along the shoreline of Cle Elum Reservoir • The proposed action would contribute to the impacts on cultural resources, including traditional cultural properties (TCPs), caused by existing reservoir operations		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Indian Sacred Sites			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No impact on Indian sacred sites is anticipated to occur because no sites have been identified in the area		
Alternatives 2 - 5	No impacts are anticipated under any of the action alternatives because no sites have been identified in the area		

Indian Trust Assets			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No impact is anticipated because no ITAs have been identified in the area		
Alternatives 2 – 5	No impacts are anticipated under any of the action alternatives because no ITAs have been identified in the area		

Environmental Justice			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No impact is anticipated		
Alternatives 2 – 5	No disproportionate impacts to minority or low-income populations are anticipated under any of the action alternatives		

Cumulative Impacts

Cumulative impacts are the effects that may result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). “Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). Section 4.24 of this FEIS evaluates cumulative impacts. The various environmental element sections in Chapters 3 and 4 of the FEIS also examine many of the cumulative impacts. Those analyses discuss the effects of past processes and trends that have cumulatively influenced or led to the resource conditions that exist today.

In addition, Reclamation considers three projects as reasonably foreseeable future projects—the Kachess Drought Relief Pumping Plant (KDRPP) and Keechelus to Kachess Conveyance (KKC) Projects, and ongoing Interstate-90 (I-90) construction. The Cle Elum Pool Raise Project would provide benefits to fish and streamflow conditions that would be beneficial at a basin-wide level when implemented with other reasonably foreseeable projects. Construction of the Cle Elum Pool Raise Project could add cumulatively to construction impacts in the area such as traffic congestion, dust, and noise. It could also cumulatively contribute to regional trends toward reduced habitat, impacts to historic and cultural resources, and construction impacts in the region. These impacts would be minor and limited in scale; therefore, the project is not likely to contribute to significant cumulative impacts of foreseeable future projects.

Environmental Commitments

Environmental commitments are measures or practices adopted by a project proponent to reduce or avoid adverse effects that could result from project operations. Specific mitigation measures for project impacts are described for each resource elsewhere in Chapter 4, including the environmental commitments from the Integrated Plan Record of Decision (Reclamation, 2013). Reclamation and Ecology share the responsibility to ensure that obligations to protect natural resources are fulfilled.

Reclamation will develop an environmental inspection and mitigation monitoring program to ensure that all environmental commitments can be met. Reclamation will coordinate development and implementation of this program with the USFS, Ecology, WDFW, WDNR, the Service, NMFS, and other State and Federal agencies, as appropriate. Reclamation will conduct environmental review and compliance on this program when it is developed.

In addition, Reclamation will implement the following measures:

- Construct all shoreline protection measures in the dry when the reservoir is drawn down to avoid in-water work
- Complete all planned shoreline protection measures prior to raising the level of the reservoir

- Continue the existing shoreline inventory to identify erosion problems and appropriate control measures
- Obtain all applicable Federal, State and local permits
- Implement mitigation measures required by the Service and NMFS through ESA consultation
- Implement conservation measures required by the Service in its Conservation Act Report
- Coordinate with Ecology’s water quality staff to ensure compliance with the State antidegradation policy
- Take measures, in coordination with the USFS, to mitigate for impacts caused by existing dispersed camping, day use, and unauthorized motor vehicle access near the north end of the reservoir
- Prior to construction, complete cultural resource studies of all areas that would be disturbed by construction
- For all cultural resources directly impacted by the project, implement mitigation measures and treatment plans as described in Section 4.19.8 and as required through further Section 106 consultation with the SHPO, Yakama Nation, Colville Confederated Tribes, and USFS
- Develop a Cultural Resource Management Plan to address ongoing and future operational and land management implications of the proposed project
- Prior to construction, conduct wetland surveys using current wetland delineation methodology. Design projects to avoid wetland impacts. If wetland impacts occur, comply with mitigation measures established in permit conditions to ensure no net loss
- Coordinate with the Corps and State and local agencies to develop appropriate methodologies to determine whether the proposed additional inundation would result in a loss of wetlands that requires permit approval. Develop and implement mitigation measures, if necessary, to meet agency permit conditions for any wetland impacts caused by increased inundation
- Prior to construction, coordinate with USFS to determine the presence of any Sensitive or Survey and Manage species and take steps to minimize impacts on those species
- Prior to construction, coordinate with WDFW to determine the presence of State-listed species and Priority Habitat and Species and take steps to minimize impacts on those species
- Prior to construction, survey utilities in construction areas and take appropriate measures to minimize conflicts with any identified utilities
- Prior to raising the pool level, identify any potentially affected on-site sewage systems (OSS) to establish baseline conditions and develop mitigation strategies

for any OSS that would become noncompliant as a result of the increased reservoir pool

- Implement best management practices when appropriate, to enhance resource protection and avoid additional potential affects to surface and groundwater quality, earth resources, fish, wildlife, and their habitats

Public Involvement

Scoping

Reclamation and Ecology initiated the public scoping process for this EIS in October 2013. Reclamation and Ecology held two public scoping meetings in Yakima, Washington on November 20, 2013 and two scoping meetings in Cle Elum, Washington on November 21, 2013. At the meetings, Reclamation described the Proposed Action and gave attendees the opportunity to comment on the project, the scope of the EIS, the EIS process, and resources evaluated in the EIS.

The scoping period began October 30, 2013, and concluded December 16, 2013. During this period 17 comment documents and telephone calls were received. The comments covered a wide range of environmental effects. The major concerns were with surface water and the use of the additional stored water and impacts to fish, vegetation and wetlands, wildlife, threatened and endangered species, recreation, land use, transportation; socioeconomics; and cumulative effects.

Reclamation and Ecology prepared a Scoping Summary Report that summarizes the comments received (Reclamation and Ecology, 2014a). Reclamation's report is available upon request or can be accessed from the Yakima River Basin Water Enhancement Project (YRBWEP) 2011 Integrated Plan website: http://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html.

Comments on the DEIS

Reclamation and Ecology released the Draft EIS (DEIS) on September 23, 2014. A Notice of Availability and Public Hearings appeared in the Federal Register on September 23, 2014. Reclamation distributed a press release announcing the availability of the DEIS and the date, time, and location of the public meetings to area media. Ecology published a Notice of Availability in area newspapers. The 60-day public comment period ended November 25, 2014.

Reclamation and Ecology distributed a total of 329 copies of the DEIS to Federal, State and local agencies; Native American Tribes; irrigation districts; interested members of organizations and entities; and the general public. The DEIS and supporting materials were also available online at Reclamation's website.

During the DEIS public comment period, Reclamation and Ecology received 21 comment letters on the DEIS with 286 individual comments. One letter was from a Tribe, three were from Federal agencies, two were from State agencies, one was from an irrigation district, seven were from organizations, and the rest were from individuals. The comment letters are included in the Comment and Responses section of this FEIS. The major concerns related to how the benefits of the project compare to the cost; the need to clarify how the additional storage capacity would be used for instream flows; the need to include the permanent fish passage facilities in the No Action Alternative; the need to clarify impacts of inundation; and the need to better define the mitigation measures. In addition, several commenters stated their opposition to providing additional storage in the Yakima basin. Some homeowners expressed concerns about the type of shoreline protection measures that would be installed on their property.

Reclamation and Ecology held two public meetings. The first meeting was held on October 21 in Ellensburg, Washington, with eight members of the public in attendance. The second meeting was held on October 22 in Cle Elum, Washington, with 13 members of the public in attendance. No comments were provided to the court reporter at either meeting.

Consultation and Coordination

Reclamation has initiated consultation with the U.S. Fish and Wildlife Service (Service) and NMFS under the Endangered Species Act (ESA). Reclamation has completed consultation with the Service under the Fish and Wildlife Coordination Act. Reclamation has initiated consultation with the Washington Department of Archaeology and Historic Preservation under Section 106 of the National Historic Preservation Act. Government-to-Government consultation with the Confederated Tribes of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and the Confederated Tribes of the Colville Reservation is ongoing. Reclamation has contacted the Bureau of Indian Affairs (BIA) Yakima Office and the BIA Colville Tribes Office regarding Indian Trust Assets or trust lands in the project area.

Reclamation and Ecology are committed to ongoing coordination with the Tribes and resource agencies. Reclamation will complete ESA coordination with the Service and NMFS. Reclamation will complete cultural resource surveys and will continue coordination with the DAHP on impacts to cultural resources. Reclamation and Ecology will continue to consult with the Yakama Nation, CTUIR, and Colville Tribes.

Changes to the Draft EIS

Reclamation and Ecology made changes to the content of the DEIS in response to public comments and further consideration of the information presented in the DEIS. Those changes are presented in this FEIS and include the following:

- Revising the description of alternatives to better define the proposed instream flow scenarios, the location of access roads and borrow areas, shoreline protection proposed for the west side of the reservoir, and improvements to aquatic habitat at stream mouths of Para, Branch and Two Coves creeks
- Revising the No Action Alternative to include construction of the permanent fish passage facilities at Cle Elum Dam and two YRBWEP Phase 2 conservation projects

- Revising the description of the affected environment to address public and agency comments
- Clarifying the impact indicators and the description of environmental effects and revising environmental effects to reflect the clarifications to the alternative descriptions
- More clearly defining proposed mitigation measures

Chapter 1

INTRODUCTION AND BACKGROUND

CHAPTER 1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

The U.S. Department of the Interior Bureau of Reclamation and the Washington State Department of Ecology have prepared this Final Environmental Impact Statement (FEIS) on the Cle Elum Pool Raise Project. Reclamation and Ecology are proposing this project as part of implementation of the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan) (Reclamation and Ecology, 2011a). The Integrated Plan is a comprehensive program of solutions developed to restore ecological functions in the Yakima River system and to provide more reliable and sustainable water resources for the health of the riverine environment and for agricultural, municipal, and domestic needs.

As joint lead agencies, Reclamation and Ecology have prepared this FEIS to meet the requirements of both the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA). The Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), U.S. Forest Service (USFS), Bonneville Power Administration (BPA), and National Marine Fisheries Service (NMFS) are serving as cooperating agencies in preparation of the FEIS in accordance with 40 Code of Federal Regulations (CFR) Section 1508.8. Under NEPA, a cooperating agency is any Federal agency, other than the lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in an action requiring an environmental impact statement (EIS). In addition, a State or local agency of similar qualifications or an Indian Tribe may, by agreement with the lead agency, become a cooperating agency.

1.2 Background

Reclamation's mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public (Beard, 1993). Ecology's mission is to protect, preserve, and enhance the State of Washington's environment for current and future generations. Consistent with its mission, Ecology has been directed by the State legislature to implement actions that provide concurrent benefits for instream and out-of stream uses for the Yakima River basin.

In June 2009, Ecology and Reclamation brought together representatives from the Yakama Nation; irrigation districts; environmental organizations; and Federal, State, county, and city governments to form the Yakima River Basin Water Enhancement Project (YRBWEP) Workgroup to help develop a solution to the basin's water problems[1]. Over the next

[1] The following websites contain information about development of the Integrated Plan:

- http://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html
- http://www.ecy.wa.gov/programs/wr/cwp/YBIP.html.

18 months, the group developed the Integrated Plan (Reclamation and Ecology, 2011a). The Plan includes the following seven elements:

- Reservoir Fish Passage
- Structural and Operational Changes
- Surface Water Storage
- Groundwater Storage
- Habitat/Watershed Protection and Enhancement
- Enhanced Water Conservation
- Market Reallocation

In 2012, Reclamation and Ecology prepared the program-level *Yakima River Basin Integrated Water Resource Management Plan Final Programmatic EIS* (Integrated Plan PEIS) (Reclamation and Ecology, 2012)[2] to determine the effects of implementing the Integrated Plan.

The Selected Alternative identified in Reclamation's Integrated Plan PEIS Record of Decision (Integrated Plan ROD) includes seven elements, each containing distinct actions, that collectively provide a comprehensive approach to water management in the Yakima River basin and meet the need to restore ecological functions and provide more reliable and sustainable water resources for the health of the riverine environment and for agricultural, municipal, and domestic needs (Reclamation, 2013).

1.3 Purpose and Need for the Action

Congress enacted the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434), which included Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP) (108 Stat. 4550 U.S. Code [USC]). Sections 1205 and 1206 provide authorization for the Cle Elum Pool Raise Project. This project includes modifying the radial gates at Cle Elum Dam to provide an additional 14,600 acre-feet of storage capacity in Cle Elum Reservoir; providing for shoreline protection of Cle Elum Reservoir; accomplishing necessary environmental mitigation; and dedicating the accrued water to instream flows (refer to the following text box). Appendix A contains the complete text of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434, 108 Stat. 4550 USC) as it relates to YRBWEP.

To advance its mission within the Yakima Project, Reclamation prepared the Integrated Plan PEIS to develop a comprehensive program of water resource and habitat improvements focused on fish passage, aquatic habitat, and water supply. The Integrated Plan PEIS confirmed that the current water resources infrastructure, programs, and policies in the Yakima River basin are not capable of consistently meeting the demands for fish and

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[2] Available online at http://www.usbr.gov/pn/programs/yrbwep/reports/FPEIS/fpeis.pdf

wildlife, irrigation, and municipal water supply (Reclamation and Ecology, 2012). The purpose of the Proposed Action is to increase the capacity of Cle Elum Reservoir and improve aquatic resources for fish habitat below Cle Elum Dam.

Excerpt from: Title XII, Yakima River Basin Water Enhancement Project, of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) pertaining to Cle Elum Pool Raise Project.

Section 1205 states:

> "(b) WATER FROM LAKE CLE ELUM- Water accruing from the development of additional storage capacity at Lake Cle Elum, made available pursuant to the modifications authorized in section 1206(a), shall not be part of the Yakima River basin's water supply as provided in subsection (a)(1). Water obtained from such development is exclusively dedicated to instream flows for use by the Yakima Project Superintendent as flushing flows or as otherwise advised by the System Operations Advisory Committee. Water may be carried over from year-to-year in the additional capacity to the extent that there is space available. Releases may be made from other Yakima Project storage facilities to most effectively utilize this additional water, except that water deliveries to holders of existing water rights shall not be impaired."

Section 1206 states:

> "(a) MODIFICATIONS AND IMPROVEMENTS - There is hereby authorized to be appropriated to the Secretary--
> (1) at September 1990 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuation of applicable indexes, $2,934,000 to--
> (A) modify the radial gates at Cle Elum Dam to provide an additional 14,600 acre-feet of storage capacity in Lake Cle Elum,
> (B) provide for shoreline protection of Lake Cle Elum, and
> (C) construct juvenile fish passage facilities at Cle Elum Dam, plus
> (2) such additional amounts as may be necessary which may be required for environmental mitigation.
> (b) OPERATION AND MAINTENANCE APPROPRIATIONS - There is hereby authorized to be appropriated to the Secretary such sums as may be necessary for that portion of the operation and maintenance of Cle Elum Dam determined by the Secretary to be a Federal responsibility."

1.4 Cle Elum Reservoir Background and History

1.4.1 Location and Setting

Cle Elum Dam is located in the upper Yakima River basin in Kittitas County within the Okanogan-Wenatchee National Forest, 8 miles northwest of the City of Cle Elum, Washington (Figure 1-1 and Frontispiece). Reclamation completed the earthfill dam in 1933, expanding the existing natural lake to a reservoir with an active capacity of 446,900 acre-feet. Reclamation facilities include Cle Elum Dam and three small saddle dikes. The dam has a maximum structural height of 165 feet and a crest length of 1,800 feet including the main dike. Cle Elum Reservoir has the largest storage capacity and average annual runoff of all the reservoirs in the Yakima River basin.

The dam is equipped with a gated spillway (sill elevation 2,223)[3] with a capacity of 40,000 cubic feet per second (cfs) at a reservoir elevation of 2,240. The spillway is a dam safety feature consisting of five radial gates and a concrete-lined open channel in the right abutment of the dam. Reclamation designed the spillway for emergency use when the capacity of the dam outlet works is not sufficient to release water from a full reservoir. When releasing floodwaters from a nearly full reservoir, Reclamation typically sets the gates to have equal openings to prevent overtopping of any one gate. Reclamation raises (opens) the gates independently using overhead cable hoists. The curved gates open by rotating upward around two anchored pivots. As part of its safety inspection, Reclamation tests and hoists each gate twice annually.

One spillway gate remains partially open for a portion of the year to supply water to the fish passage flume at the dam's temporary juvenile fish passage facility. Reclamation handles all other routine releases from the reservoir through the dam outlet works. The outlet works consist of a gated control tower and a reinforced concrete pipe through the right abutment of the dam. Water released from the dam flows into the Cle Elum River, which flows into the Yakima River 8 miles downstream from the dam. Water released from Cle Elum Reservoir supplies the Kennewick, Kittitas, Roza, Sunnyside, and Wapato irrigation divisions in the Yakima Project (Figure 1-1). Cle Elum Reservoir is the main source of water to meet the large irrigation demands in the lower Yakima River basin.

1.4.2 Yakima Project

Reclamation operates Cle Elum Reservoir as part of the Yakima Project. Congress authorized the Yakima Project beginning in 1905, directing Reclamation to develop irrigation facilities in the Yakima River basin. The Yakima Project includes five major storage reservoirs—Keechelus, Kachess, Cle Elum, Bumping Lake, and Rimrock (Figure 1-1). Water is stored and released in these reservoirs to meet irrigation demands, flood control needs, and instream flow requirements. Reclamation operates the reservoirs as a pooled system with no reservoir or storage space designated for a specific area.

A complex group of Federal and State statutes and regulations, as well as court decisions and orders, regulate water management in the Yakima River basin. Additionally, Reclamation operates the Yakima Project according to its Yakama Treaty obligations, delivering the Yakama Nation's "time immemorial" water right according to court orders. Sections 1.6.3 and 1.6.4 of the Integrated Plan PEIS (Reclamation and Ecology, 2012) describe some of the key statutes, regulations, and legal decisions related to water management in the basin. The following paragraphs describe the key issues relevant to understanding the Cle Elum Pool

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[3] Elevations at Cle Elum Reservoir are based on Reclamation's local datum, established when the dam was constructed. Elevations do not correspond to a standard datum. The Cle Elum datum is approximately 5.4 feet below the NAVD88 datum.

Raise Project as it pertains to proratable entitlements considered in the four action alternatives analyzed in this FEIS.

Water entitlements are the amount of water contracted for delivery from Reclamation project water. Water entitlements[4] in the Yakima basin, including irrigation and municipal entitlements, are based on two classes of water rights—nonproratable and proratable. Entities are irrigation organizations, or others, who hold water rights, or are entitled to water. Entities with nonproratable water rights are considered "senior" and generally hold rights used prior to construction of the Yakima Project reservoirs. Entities with nonproratable water rights are served first. Entities with entitlements based on proratable water rights share equal priority.

Prorationing refers to the process of equally reducing the percentage of the entitlement delivered to proratable water users in deficit years based on the court doctrine of total water storage available (TWSA). TWSA is defined as:

> *That amount of water available in any year from natural flow of the Yakima River, and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources, to supply the contract obligations of the United States to deliver water and to supply claimed rights to the use of water on the Yakima River, and its tributaries, heretofore recognized by the United States. (Civil Action No. 21 (1945 Consent Decree) Article 4, 1st Para.).*

Reclamation estimates TWSA annually based on forecasted runoff, forecasted return flows, and reservoir storage contents.

[4] Water entitlements in the Yakima River basin represent the full contracted amount of water to be delivered to the irrigation entity backed by a State water right. If the entitlement is based on a water right that is proratable, the entitlement will be reduced if water supply is not sufficient to service all contracted users.

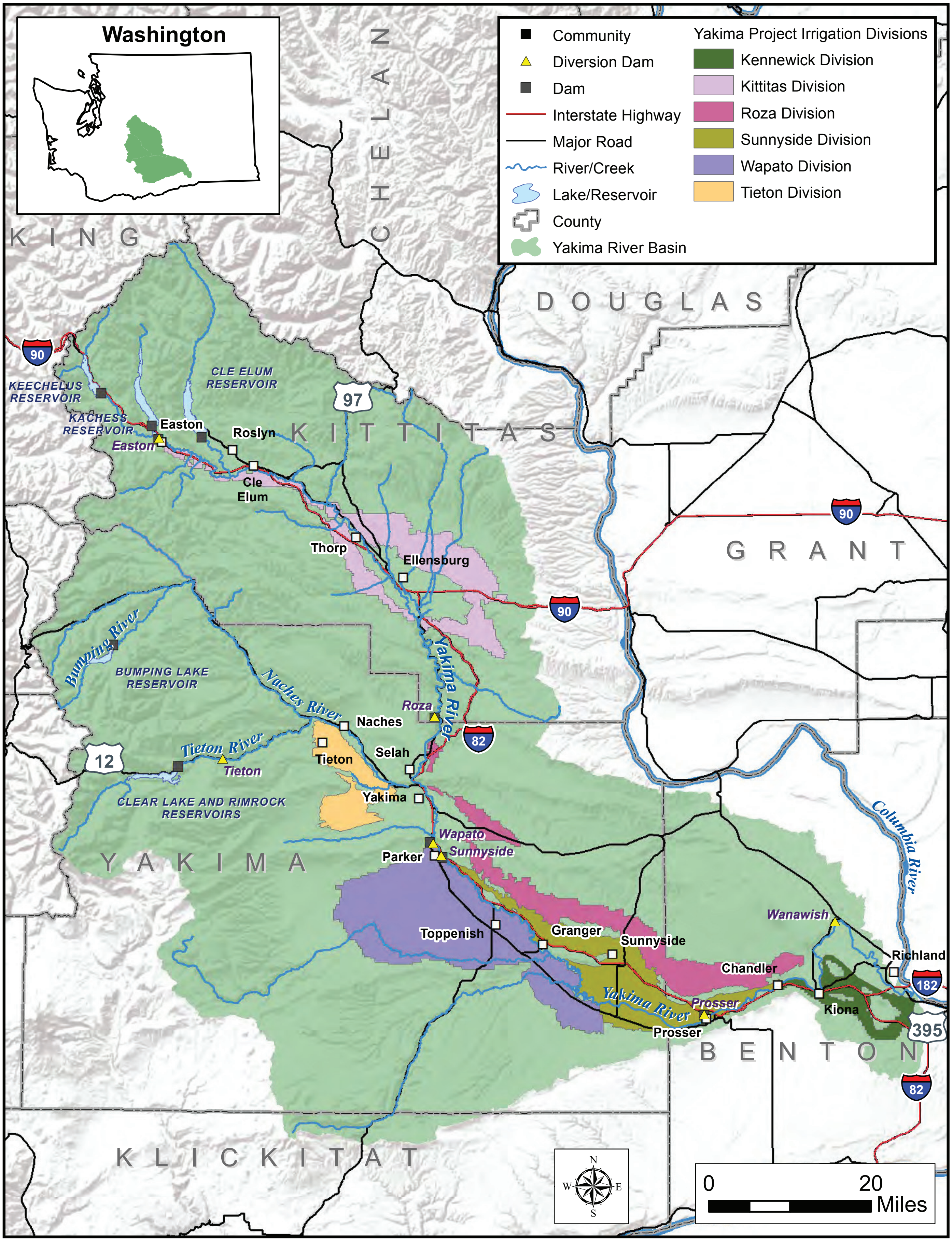

Figure 1-1. Yakima River Basin

1.4.3 History of the Cle Elum Pool Raise Project

For many years, Reclamation and Ecology have recognized the need for additional water storage capacity in the Yakima Project as water demands in the Yakima basin increased but storage remained the same. The 1977 drought in the Yakima basin prompted legislative action for additional water supply. In 1979, the Washington State Legislature provided $500,000 for "…preparation of feasibility studies related to a comprehensive water supply project designed to alleviate water shortage in the Yakima River basin." Also in 1979, Congress authorized, funded, and directed the U.S. Department of the Interior, through Reclamation, to "…conduct a feasibility study of the Yakima River Basin Water Enhancement Project (YRBWEP) in cooperation with the State" (Act of December 28, 1979, Public Law 96-162). Beginning in the 1980s, Reclamation conducted numerous studies to identify ways to increase the storage capacity of Cle Elum Reservoir. Potential options identified by these studies include accessing inactive storage (storage water below the elevation of the outlet channel and thereby inaccessible with existing facilities) and increasing the storage capacity of the reservoir. Reclamation concluded that raising the reservoir pool level by 3 feet to add 14,600 acre-feet of storage capacity would provide the greatest additional storage capacity for the least cost and result in the fewest environmental impacts (Section 2.9.2).

In the early 1990s, interest in continuing the YRBWEP study process was renewed. As a result, Congress enacted the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP) (108 Stat. 4550 USC) (commonly referred to as Phase II of YRBWEP). This legislation authorized implementation and study of primarily nonstorage components for YRBWEP. The legislation intended that the YRBWEP study and implementation results would be the basis for future YRBWEP Phase III legislation, to include elements such as construction of water storage features needed for a complete YRBWEP plan to meet habitat, agricultural, municipal, and industrial needs of the basin.

Refinement of the Cle Elum Pool Raise alternative to add 14,600 acre-feet of storage capacity occurred over a 20-year period following the 1994 congressional authorization. Reclamation evaluated the environmental impacts associated with the Cle Elum Pool Raise in its 1999 *Yakima River Basin Water Enhancement Project, Washington, Final Programmatic Environmental Impact Statement* (Reclamation, 1999a). Reclamation issued the ROD on the Final YRBWEP PEIS in March 1999, and selected Alternative 2A of the Final PEIS as the preferred alternative (Reclamation, 1999b). Alternative 2A includes the Cle Elum Pool Raise, implementation of all Title XII measures, and a 7.5 percent basinwide reduction in diversion demands except for the Wapato Irrigation Project (WIP) and the Yakima-Tieton Canal. The Final YRBWEP PEIS and ROD are available on Reclamation's Cle Elum Pool Raise website at http://www.usbr.gov/pn/programs/eis/cleelumraise/index.html.

After recommending incorporation of the Cle Elum Pool Raise into the Integrated Plan in 2011 (Section 1.7 in Reclamation and Ecology, 2012), Reclamation and Ecology prepared a technical memorandum on the Cle Elum Pool Raise as part of the studies undertaken for the Integrated Plan PEIS (Reclamation and Ecology, 2011c). The technical memorandum updated Reclamation's earlier estimates of cost, extent of additional shoreline inundation, and areas needing shoreline protection (Reclamation, 2000a and 2002). The technical memorandum also evaluated forms of shoreline protection other than the traditional use of rock, and using the additional capacity for instream uses or TWSA.

The environmental impacts of increasing the storage capacity of Cle Elum Reservoir and dedicating the accrued water to TWSA were evaluated in the Integrated Plan PEIS (Reclamation and Ecology, 2012). Since that time, Reclamation and Ecology have conducted additional hydrologic modeling to develop options for using the additional storage capacity. Further studies to evaluate shoreline conditions at Cle Elum Reservoir have resulted in proposals for shoreline protection strategies (Reclamation, 2014a, 2014b, and 2014c) that are less expensive than traditional rock protection with fewer environmental impacts.

Reclamation and Ecology have prepared this project-specific FEIS to evaluate the impacts to the environment from the Proposed Action (Alternative 2) and four other alternatives, including No Action (Section 2.3).

1.5 Intended Use of this Final Environmental Impact Statement

This FEIS is intended to provide full and fair discussion of significant environmental impacts of the proposed action and to inform decisionmakers and the public of the reasonable alternatives that would meet the project objectives while avoiding or minimizing adverse impacts or enhance the quality of the human environment. The FEIS identifies and evaluates the following items:

- Direct, indirect, and cumulative effects and their significance
- Potential for conflicts with the objectives of Federal, regional, State, and local land use plans and policies
- Energy requirements and conservation potential
- Natural or depletable resource requirements and conservation potential
- Means to reduce or avoid adverse environmental impacts
- Any adverse environmental effects that cannot be avoided
- The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity
- Any irreversible and irretrievable commitments of resources

The Federal lead agency (Reclamation) will use the FEIS when considering approval of alternatives to accomplish the proposed action. All cooperating agencies and other Federal, State, and local agencies with authority over any aspect of the proposed action are expected to use the information contained in this FEIS to meet some, if not all, of their information needs, to make decisions, and to issue permits with respect to the proposed action consistent with their authority.

Table 1-1 presents the roles and responsibilities of Federal agencies that may use this FEIS to support their decisionmaking needs. Reclamation will publish this FEIS, use it to support the Federal decision, and document that decision in a ROD. As the SEPA lead agency for this EIS, Ecology will use this FEIS to meet its SEPA requirements to evaluate probable significant adverse impacts of the proposed action. Ecology will also use this FEIS to support future decisionmaking and permitting for the proposed action and selected alternative.

Table 1-1. Federal Agency Roles and Responsibilities

Federal Agency	Role/Responsibility
Reclamation	• NEPA lead agency • Complete Federal Endangered Species Act consultation • Prepare EIS and Record of Decision • Implement Reclamation's decision contained in the Record of Decision
U.S. Forest Service (cooperating agency)	• Regulate occupancy and use of National Forest lands under the National Forest Management Act and Northwest Forest Plan
National Marine Fisheries Service (cooperating agency)	• Participate in Federal Endangered Species Act consultation • Verify compliance with the Magnuson-Stevens Act
U.S. Fish and Wildlife Service	• Participate in Federal Endangered Species Act consultation • Verify compliance with the Fish and Wildlife Coordination Act
U.S. Army Corps of Engineers	• Permit project under Section 404 of the Clean Water Act
U.S. Environmental Protection Agency	• Review and file the EIS

1.6 Requirements Prior to Implementation

Additional funding must be secured to implement the proposed action and alternatives. Also, congressional authorization would be required to implement Alternatives 4 or 5, which involve using the water for purposes other than instream flow.

Other steps may be required prior to implementation:

- Cultural resource surveys must be completed
- Consultations must be completed consistent with Section 106 of the National Historic Preservation Act (NHPA)
- Compliance with the Endangered Species Act (ESA) must be completed
- Federal and State permits must be secured (a list of anticipated permits is included in the SEPA Fact Sheet at the beginning of this EIS)

1.7 National and State Environmental Policy Act Review Process

The National Environmental Policy Act of 1969 requires that the action agency analyze and disclose the effects of its proposed action and alternatives. This FEIS for the Cle Elum Pool Raise Project describes this evaluation. The State Environmental Policy Act (Chapter 43.21C RCW) requires an EIS for all major actions having a probable significant, adverse environmental impact.

Reclamation filed a Notice of Intent to prepare an EIS in the Federal Register on October 30, 2013, informing the public of the proposed environmental analysis and identifying opportunities for involvement during EIS preparation. On November 4, 2013, Ecology issued a SEPA Determination of Significance. The Notice of Intent and Determination of Significance initiated the scoping process. During the scoping period, Reclamation, Ecology, and the cooperating agencies collaborated with the public and interested parties to identify concerns, issues, evaluation methods, and alternatives for the Draft EIS (DEIS).

The potential effects of Proposed Action and alternatives and of mitigation measures appear in the DEIS. Reclamation published a Notice of Availability in the Federal Register on September 23, 2014, announcing the availability of the DEIS for review and comment by the public, as well as Tribes, Federal and State agencies, decisionmakers, and local jurisdictions having interest in the proposed action. The comment period for the DEIS ended on November 25, 2014.

The 21 letters on the DEIS that Reclamation and Ecology received address 286 issues, questions, or comments. This FEIS reflects consideration of the comments received; responses to which are tallied in the Comment and Response section following Chapter 5. Reclamation published a Notice of Availability in the Federal Register for the FEIS. The NEPA process ends when Reclamation prepares a ROD explaining the agency's decision, describing the alternatives considered (including the environmentally preferred alternative), and discussing commitments to mitigate potential environmental effects and monitor those commitments. The ROD cannot be issued until at least 30 days after the U.S. Environmental Protection Agency (EPA) has published in the Federal Register its Notice of Availability indicating receipt of the FEIS. SEPA does not require preparation of a decision document, but prohibits the lead agency from taking action on a project for 7 days after issuance of the FEIS.

1.7.1 Tiering to the Integrated Plan PEIS

This FEIS is tiered to the Integrated Plan PEIS (Reclamation and Ecology, 2012). According to NEPA, tiering of environmental analysis

> *… refers to the coverage of general matters in broader environmental impact statements … with subsequent narrow statements or environmental analyses …, incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared* (40 CFR 1508.28).

SEPA regulations are similar, stating that agencies may conduct a “phased review” so that the environmental analysis “focuses on issues that are ready for decision and exclude[s] from consideration issues already decided or not yet ready” (Washington Administrative Code [WAC] 197-11-060).

Reclamation originally evaluated the Cle Elum Pool Raise Project at a programmatic level in the 1999 *Yakima River Basin Water Enhancement Project, Washington, Final Programmatic Environmental Impact Statement* (Reclamation, 1999a). Reclamation and Ecology later evaluated the project at a broad level in the Integrated Plan PEIS (Reclamation and Ecology, 2012), under the “Structural and Operational Changes” element of the Integrated Plan. The Integrated Plan PEIS and Integrated Plan ROD included use of the accrued water from the Cle Elum Pool Raise for TWSA as well as instream flows. The findings of the Integrated Plan PEIS regarding the conditions and environmental effects of the Cle Elum Pool Raise Project are still valid. The use of the accrued water for TWSA is analyzed in this EIS as an alternative to the Proposed Action (Alternative 2). This tiered document expands on the PEIS with detailed engineering and environmental analysis that refines the project features, impacts, and footprint. The more site-specific analysis in this FEIS is based on the additional technical and environmental studies and project design that Reclamation and Ecology have undertaken on the Cle Elum Pool Raise Project since issuance of the Integrated Plan ROD. The Integrated Plan PEIS is available online at http://www.usbr.gov/pn/programs/yrbwep/reports/FPEIS/fpeis.pdf.

1.7.2 Documents Adopted Under SEPA

Pursuant to provisions of the SEPA rules (WAC 197-11-630), Ecology has adopted the Integrated Plan PEIS (Reclamation and Ecology, 2012) to meet a portion of its responsibilities under SEPA (see Notice of Adoption for the Integrated Plan PEIS in Appendix B).

1.8 Authorization for the Proposed Action (Alternative 2)

1.8.1 Federal Authorization

The Secretary of the Interior authorized the Tieton and Sunnyside Divisions of the Yakima Project under the Reclamation Act of June 17, 1900, and December 12, 1905, for the purposes of storage, diversion, development of waters, and the construction of irrigation works for the reclamation of arid lands. Reclamation constructed Cle Elum Dam under this authority in 1933.

The YRBWEP was authorized on December 28, 1979 (93 Stat. 1241, Public Law 96-162, Feasibility Study—Yakima River Basin Water Enhancement Project [YRBWEP]). This legislation provides the authority for the ongoing feasibility studies related to this FEIS.

Section 1205 of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434), Title XII, Yakima River Basin Water Enhancement Project (108 Stat. 4550 USC), authorized fish, wildlife, and recreation as additional purposes of the Yakima Project. Congress specifically authorized the Cle Elum Pool Raise Project in Sections 1205 and 1206. The accrued stored water is authorized for instream flows, to be used as described in Section 1205 of the Act. Inclusion of the accrued stored water as part of TWSA or use of the water for purposes other than instream flows would require congressional authorization.

1.8.2 Washington State Authorization

The Washington State Legislature authorized implementation of the Integrated Plan, including the Cle Elum Pool Raise Project, in the 2013 Yakima Policy Bill (2SSB 5367). The bill establishes mechanisms for implementing work on the Integrated Plan. It authorizes Ecology to implement the Integrated Plan and to develop solutions that provide concurrent benefits for both instream and out-of-stream uses. The goals of the bill are to protect and enhance fish and wildlife resources, improve water availability and reliability, establish more efficient water markets, manage the variability of water supplies, and prepare for the uncertainties of climate change through operational and structural changes. The bill includes authorization for the Washington State Department of Natural Resources (DNR) to purchase private land in the Teanaway River basin to establish the Teanaway Community Forest (TCF) and instructions that DNR, in collaboration with Washington Department of Fish & Wildlife (WDFW), manage it for the following purposes consistent with the Integrated Plan:

- To protect and enhance the water supply and protect the watershed
- To maintain working lands for forestry and grazing while protecting key watershed functions and aquatic habitat
- To maintain and, where possible, expand recreational opportunities consistent with watershed protection
- To conserve and restore vital habitat for fish

The DNR completed purchase of the property in October 2013. DNR and WDFW are working with an advisory committee to develop a management plan for the TCF. A draft management plan was released for public comment in April 2015.

A specific provision of the bill related to the Cle Elum Pool Raise Project is establishment of a “Water Supply Facility Permit and Funding Milestone” (Milestone). To achieve the Milestone, permitting and funding must be completed by 2021, for one or more water supply facilities designed to provide at least 214,000 acre-feet of additional water supply. If the Milestone is not met, the bill authorizes the Board of Natural Resources to transfer the TCF land to the common school trust and to manage the land for the beneficiaries of the trust. The Cle Elum Pool Raise Project would provide 14,600 acre-feet of additional storage capacity toward that Milestone.

Additional authorization for the State of Washington to implement the Integrated Plan is contained in the 2013-to-2015 Capital Budget (ESSB 5035, Section 3077). This section of the Capital Budget appropriates $32 million in capital funds to move several Integrated Plan projects and activities forward and approximately $99 million for the purchase of the TCF land.

1.8.3 Water Rights

Reclamation will comply with State storage statutes (Revised Code of Washington [RCW] 90.40) regarding this project. Existing water rights may need to proceed through a State administrative process to change elements of the water right, such as place of use. Additionally, Reclamation may need to temporarily use water for construction processes and dust control. The agencies will base this temporary use on existing and confirmed water rights, or on a limited State permit.

1.9 Regulatory Compliance and Directions to Agencies

This section describes the key Federal laws, Executive Orders (EOs), and Secretarial orders that may apply to the Proposed Action. Additional regulations are included in applicable resource sections in Chapter 3.

1.9.1 Endangered Species Act

The Endangered Species Act (Public Law 93-205, dated December 28, 1973) requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of ESA-listed species, or destroy or adversely modify their critical habitat. As part of the ESA Section 7 process, an agency must request a list of species from the U.S. Fish and Wildlife Service (Service) and NMFS that identifies threatened and endangered species within or near the Federal action area. The agency then must evaluate impacts on those species and designated critical habitat through preparation of a biological assessment. If the action may impact any ESA-listed species or designated critical habitat, the agency must consult with the Service, NMFS, or both. Section 4.9 describes potential impacts to ESA-listed species.

1.9.2 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) (Public Law 96-366, dated September 29, 1980) provides for equal consideration of wildlife conservation in coordination with other features of water resource development programs. The FWCA requires that any plans to impound, divert, control, or modify any stream or other body of water must be coordinated with the Service and State wildlife agency (in this case, WDFW) through consultation directed toward prevention of fish and wildlife losses and development or enhancement of these resources. The Coordination Act Report documents the results of the consultation. Sections 4.6, 4.8, and 4.9 describe how the Proposed Action (Alternative 2) and alternatives might affect resources addressed through the FWCA. Section 5.4.2 describes Reclamation's FWCA process.

1.9.3 National Historic Preservation Act

The National Historic Preservation Act (Public Law 89-665, dated October 15, 1966), as amended, requires that Federal agencies consider the effects of their projects on properties eligible for or listed on the National Register of Historic Places (NRHP). Regulations in 36 CFR 800 describe the procedures that Federal agencies must follow to comply with the NHPA. For any undertaking, Federal agencies must determine if properties of NRHP quality are present in the project area, the effects of the project on those properties, and the appropriate mitigation for adverse effects. In making these determinations, Federal agencies are required to consult with the State Historic Preservation Office (SHPO), Native American Tribes with a traditional or culturally significant religious interest in the study area, the interested public, and in certain cases, the Advisory Council on Historic Preservation. Section 4.19 describes potential impacts on listed and eligible resources.

1.9.4 Native American Graves Protection and Repatriation Act

Native American Graves Protection and Repatriation Act (NAGPRA) (Public Law 101-601, dated October 16, 1990) regulates Tribal consultation procedures in the event of discoveries of Native American graves and other NAGPRA “cultural items.” Under the act, discovery of graves or other NAGPRA cultural items requires the Federal agency to consult with Tribes during project planning. NAGPRA details the procedures required for repatriation of human skeletal remains and other cultural items with the Tribes. Section 5.3 describes Reclamation’s consultation process with Tribal representatives.

1.9.5 Clean Water Act

The Clean Water Act (Public Law 92-500, dated October 18, 1972) regulates discharges of pollutants into the water of the U.S. and establishes surface water quality standards. Under Section 404 of the act, the U.S. Army Corps of Engineers (Corps) regulates the discharge of dredge and fill material into the waters of the U.S., including wetlands. Permit review and issuance follows a process that encourages, in sequence, avoiding impacts, minimizing impacts, and requiring mitigation for unavoidable impacts to the aquatic environment. Issuance of a Section 404 authorization by the Corps triggers the need to comply with the provisions of Section 401 of the act, which requires water quality certification. Section 401 authorization is issued by the State. Sections 4.4 and Section 4.7 of this FEIS describe the potential impacts to water quality and wetlands, respectively.

1.9.6 Executive Order 11990: Wetlands

EO 11990, dated May 24, 1977, directs Federal agencies carrying out programs affecting land use to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial value of wetlands. Wetlands provide great natural productivity, hydrological utility, environmental diversity, natural flood control, improved water quality, aquifer recharge, flow stabilization for streams and rivers, and habitat for fish and wildlife resources. Section 4.7 describes potential impacts to wetlands.

1.9.7 Executive Order 13007: Indian Sacred Sites

EO 13007, dated May 24, 1996, instructs Federal agencies to promote accommodation of access to, and to protect the physical integrity of, American Indian sacred sites. A “sacred site” is a specific, discrete, and narrowly delineated location on Federal land. An Indian Tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. The Tribe or authoritative representative must inform the agency of the existence of such a site. Section 4.20 of this FEIS describes potential impacts to Indian sacred sites.

1.9.8 Executive Order 12898: Environmental Justice

EO 12898, dated February 11, 1994, instructs Federal agencies to make achieving environmental justice part of its mission to the extent practicable and permitted by law. Agencies are to achieve this by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Environmental justice means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs. Section 4.22 describes the potential environmental justice impacts associated with the Cle Elum Pool Raise Project.

1.9.9 Executive Order 13175: Consultation and Coordination with Tribal Governments

EO 13175, dated November 15, 2000, instructs Federal agencies to consult, to the greatest extent practicable and to the extent permitted by law, with Tribal Governments prior to taking actions that affect federally recognized Tribes. Each agency shall assess the impact of Federal Government plans, projects, programs, and activities on Tribal trust resources and assure consideration of Tribal rights and concerns during the development of such plans, projects, programs, and activities. Section 5.3 documents Reclamation's Tribal consultation and coordination process for this project.

1.9.10 Secretarial Order 3175: Department Responsibilities for Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the U.S. (with the Secretary of the Interior acting as trustee) for Indian Tribes or Indian individuals. Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights.

The U.S. has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian Tribes or Indian individuals by treaties, statutes, and EOs. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that officials from Federal agencies, including Reclamation, take all actions reasonably necessary to protect ITAs. Section 4.21 describes potential ITAs in the Cle Elum Pool Raise Project area.

1.9.11 Executive Order 11988: Floodplain Management

EO 11988 (May 24, 1977, amended January 30, 2015) instructs Federal agencies prior to taking an action to determine whether the proposed action will occur in a floodplain. If the action occurs in a floodplain, the agency must consider alternatives to avoid adverse effects to the greatest extent practicable. If the only feasible alternatives are located within a floodplain, the agency shall take action to design or modify its action to minimize potential harm to or within the floodplain consistent with regulations accompanying EO 11988. Section 5.4.7 describes the potential effects of the Proposed Action (Alternative 2) and alternatives on floodplains.

1.9.12 Executive Order 13112: Invasive Species

EO 13112, dated February 3, 1999, directs all Federal agencies to prevent and control introduction of invasive nonnative species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. Executive Order 13112 established the national Invasive Species Council, made up of Federal agencies and departments, and the supporting Invasive Species Advisory Committee, composed of State, local, and private entities. The Invasive Species Council and Advisory Committee oversee and facilitate implementation of the EO, including preparation of a national invasive-species management plan. Section 4.7 of this FEIS describes Reclamation’s process for addressing invasive species.

1.9.13 Secretarial Order 3330: Improving Department Mitigation Policies and Practices

Secretarial Order 3330, dated October 31, 2013, establishes a Department of the Interior-wide, science-based mitigation strategy to ensure consistency and efficiency in the review and permitting of infrastructure development projects and in conserving the nation's valuable natural and cultural resources. In response to Secretarial Order 3330, “*A Strategy for Improving the Mitigation Policies and Practices of the Department of the Interior*” (Clement et al., 2014) was developed by the Energy and Climate Change Task Force in April 2014. This report describes the Department’s concept to avoid potential environmental impacts from projects through four distinct steps that identify areas suitable for development because of low or relatively low natural and cultural resource conflicts:

- Identify key landscape-scale attributes, and the conditions, trends, and baselines that characterize these attributes
- Develop landscape-scale goals and strategies
- Develop efficient and effective compensatory mitigation programs for impacts that cannot be avoided or minimized
- Monitor and evaluate progress and make adjustments, as necessary, to ensure that mitigation is effective despite changing conditions.

Chapter 4 of this FEIS describes Reclamation’s mitigation measures at the end of each resource addressed.

1.10 Permits, Consultations, and Approvals

Between the two agencies, Reclamation and Ecology will obtain required Federal and State permits, as appropriate, and meet other requirements set forth by law, regulation, ordinance, and policy. Table 1-2 summarizes the anticipated permit requirements. The applicable resource sections in Chapters 3 and 4 discuss other laws. Chapter 5 describes Reclamation’s public involvement and agency consultations and coordination.

Table 1-2. Summary of Potential Permit Requirements and Other Approvals

Agency	Permits and Other Requirements	Jurisdiction/Purpose
Federal Agencies		
Service and NMFS	Endangered Species Act (16 USC § 1531)	Consultation to determine effects on threatened and endangered species.
NMFS	Magnuson-Stevens Fishery Conservation and Management Act (16 USC §§ 1801-1802)	Consultation with NMFS on activities that may adversely affect essential fish habitat to determine whether the proposed action “may adversely affect” designated essential fish habitat for relevant commercially, federally managed fisheries species within the area of the proposed action.
Service	Fish and Wildlife Coordination Act (16 USC 661066c)	Coordination with the Service on the effects of the project on fish and wildlife.
Corps	Clean Water Act Section 404 (33 USC §1251 et seq.)	Permitting and minimization of impacts associated with the discharge of dredged or fill material into waters of the U.S., including wetlands.
State Agencies		
Ecology	Clean Water Act Section 401 (33 USC § 1251 et seq.)	Issuance of a Section 401 Water Quality Certification to indicate reasonable assurance that a project will comply with Federal and State water quality standards and other aquatic resource protection requirements under Ecology’s authority; triggered as part of Clean Water Act Section 404 authorization
Ecology	Construction National Pollution Discharge Elimination System (90.48 RCW); Clean Water Act Section 402 (33 USC § 1251 et seq.)	Issuance of a permit for construction projects engaged in clearing, grading, and excavating activities that disturb an area of at least 1 acre; Federal regulation delegated to the State.
Ecology	RCW 90.03 and 90.40	Issuance of water rights, as necessary.
WDFW	Hydraulic Project Approval (77.55 RCW)	Granting of approval for construction projects that use, divert, obstruct, or change the natural bed or flow of State waters.
WDFW	Fish and Wildlife Coordination Act (16 USC 661066c)	Coordination with WDFW on effects of the project on fish and wildlife species.
Washington Department of Archaeology and Historic Preservation	National Historic Preservation Act (16 USC § 470 et seq.)	Consultation under Section 106 to determine whether the project would impact historic or cultural resources; to be completed by Reclamation and Ecology. Washington Department of Archaeology and Historic Preservation advises and assists Federal agencies in carrying out their Section 106 responsibilities.
Local Agencies		
Kittitas County	Critical Areas Ordinance Shoreline Master Program	Granting of approval for actions on private land within the county’s shoreline jurisdiction.

1.11 Public Involvement

Reclamation and Ecology collaborated with several agencies, entities, and organizations to develop the Integrated Plan and the Cle Elum Pool Raise Project. Chapter 6 of the Integrated Plan PEIS (Reclamation and Ecology, 2012) describes the public process for developing the Integrated Plan.

The scoping process for this EIS officially began on October 30, 2013, with the publication in the Federal Register of a Notice of Intent to Prepare an EIS. Reclamation and Ecology held public scoping meetings on November 20, 2013, in Yakima and November 21, 2013, in Cle Elum, Washington. Major issues raised during scoping included the uses of the additional storage capacity and potential impacts to specific resources such as fish, threatened and endangered species, wetlands, vegetation, and recreation.

Chapter 5 of this FEIS provides more information on the scoping process and comments. The scoping report is available at http://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html. Chapter 5 also describes the additional public outreach efforts undertaken and public input received by Reclamation and Ecology.

The DEIS was released to the public on September 23, 2014, when Reclamation published an announcement in the Federal Register that the DEIS was available for review and comment by the public, as well as Tribes, other Federal and State agencies, decisionmakers, and local jurisdictions having interest in the proposed action. The comment period for the DEIS, which ended November 25, 2014, generated 21 comment letters, with 286 individual comments. Reclamation and Ecology have considered the comments received during the public review period and have responded with meaningful revisions throughout this FEIS.

Chapter 5 of this FEIS includes a summary of the public comments on the DEIS. Those comments and Reclamation and Ecology's responses to those comments are included in the Comments and Responses section of this FEIS, following Chapter 5.

1.12 Changes to the DEIS Content

Reclamation and Ecology made changes to the content of the DEIS in response to public comments and further consideration of the information presented in the DEIS. Those changes are presented in this FEIS and include the following:

- Revising the description of alternatives to better define the proposed instream flow scenarios, the location of access roads and borrow areas, shoreline protection proposed for the west side of the reservoir, and improvements to aquatic habitat at stream mouths of Para, Branch and Two Coves creeks
- Revising the No Action Alternative to include construction of the permanent fish passage facilities at Cle Elum Dam and two YRBWEP Phase 2 conservation projects
- Revising the description of the affected environment to address public and agency comments

- Clarifying the impact indicators and the description of environmental effects and revising environmental effects to reflect the clarifications to the alternative descriptions
- More clearly defining proposed mitigation measures

1.13 How to Read this Document

This FEIS includes the following chapters:

- **Chapter 1** provides background information on the Cle Elum Pool Raise Project and the Integrated Plan, the purpose and need for the action, legal authorities for the project, permits and approvals, and a brief description of public involvement. Chapter 1 also includes information on Reclamation's incorporation by reference of the Integrated Plan PEIS and Ecology's adoption of the Integrated Plan PEIS.
- **Chapter 2** describes the proposed action, reasonable alternatives to the proposed action, and the No Action Alternative. The chapter describes the alternatives development process and alternatives eliminated from detailed evaluation.
- **Chapter 3** describes the affected environment and existing conditions for the environmental resources that the proposed action and alternatives could affect.
- **Chapter 4** evaluates the potential environmental consequences of the proposed action and alternatives, and identifies mitigation measures that would avoid or reduce their adverse effects. Section 4.23 presents the cumulative impacts of the proposed action and alternatives. Section 4.24 is included for the purposes of SEPA to describe how the Proposed Action (Alternative 2) meets the goals of the Integrated Plan. Sections 4.25 through 4.29 describe other aspects of Reclamation's compliance with NEPA procedures, including a description of unavoidable adverse impacts; relationship between short-term and long-term productivity; irreversible and irretrievable commitments of resources, energy and depletable resources; and Reclamation's environmental commitments.
- **Chapter 5** describes public involvement, consultation, and coordination, and compliance undertaken in the preparation of this FEIS.
- **Comments and Responses** follows Chapter 5 and includes all the written public comments received on the DEIS and responses thereto. The comment responses indicate where the FEIS has been revised to address certain comments.

Ancillary materials at the end of this FEIS include a list of FEIS preparers, the distribution list, references, and a glossary of project-specific terms. Appendices to accompany information presented in this FEIS are attached at the end of the document.

Chapter 2

PROPOSED ACTION AND ALTERNATIVES

CHAPTER 2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This chapter of the FEIS describes the Proposed Action (Alternative 2), three additional action alternatives, and the No Action Alternative. The process that Reclamation and Ecology used to develop the Proposed Action and alternatives is described in Section 2.2.1. Alternatives initially considered but eliminated from detailed analysis in the EIS are discussed in Section 2.9. A summary comparison of the environmental impacts of the alternatives is included at the end of this chapter.

Reclamation and Ecology have modified the Cle Elum Pool Raise Project since it was described in the *Yakima River Basin Integrated Water Resource Management Plan Final Programmatic EIS* (Integrated Plan PEIS) (Reclamation and Ecology, 2012). In the Integrated Plan PEIS, additional storage capacity from the project was to be used for total water storage available (TWSA). In this FEIS, the Proposed Action (Alternative 2) would use the additional storage capacity for instream flow, which is consistent with the congressional authorization as described in Chapter 1. Use of the additional storage capacity for TWSA is analyzed in this FEIS as an alternative to the Proposed Action (Alternative 2).

2.2 Range of Alternatives and Identification of the Preferred Alternative

2.2.1 Range of Alternatives

Reclamation developed the Cle Elum Pool Raise Project over the past three decades through various studies and the Federal authorization as described in Section 1.4.3. The alternatives presented in this FEIS were prepared in response to the Title XII legislation (Section 1.3); contemporary studies; the Integrated Plan PEIS; input received during public scoping and coordination with cooperating agencies (Chapter 5); and the purpose and need statement (Section 1.3).

Reclamation and Ecology developed the Proposed Action and three action alternatives for implementing the Cle Elum Pool Raise Project, in addition to the No Action Alternative required by NEPA and SEPA. All action alternatives share the same approach for increasing the capacity of the reservoir; the differences involve the use of the accrued water and the methods for shoreline protection. This FEIS examines five alternatives in detail:

- Alternative 1 – No Action Alternative
- Proposed Action (Alternative 2) – Additional Storage Capacity Used for Instream Flow with Rock Shoreline Protection
- Alternative 3 – Additional Storage Capacity Used for Instream Flow with Hybrid Shoreline Protection (Preferred Alternative)

- Alternative 4 – Additional Storage Capacity Used for TWSA with Rock Shoreline Protection
- Alternative 5 – Additional Storage Capacity Used for TWSA with Hybrid Shoreline Protection

2.2.2 Preferred Alternative

Reclamation and Ecology have identified Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection as the Preferred Alternative. Alternative 3 meets the purpose and need of the Proposed Action to increase the capacity of Cle Elum Reservoir and improve aquatic resources for fish habitat below Cle Elum Dam. Hybrid shoreline protection would prevent erosion while reducing environmental impacts in shoreline areas.

2.3 Alternative 1 – No Action Alternative

Under Alternative 1 – No Action, the Cle Elum Pool Raise Project would not be implemented and the capacity of the reservoir would not be increased. Reclamation would continue to manage water supply provided by Cle Elum Reservoir consistent with current operational practices and constraints. Reclamation would also continue inspections and maintenance of shorelines in accordance with its *Standard Operating Procedures* and the *Directives and Standards* (Reclamation, 2001).

2.3.1 Projects and Actions under the No Action Alternative

For the purpose of this FEIS, Reclamation and Ecology consider Alternative 1 – No Action to include projects and actions that meet all of the following criteria:

- Planned and designed
- Authorized with identified funding for implementation
- Scheduled for implementation

Four projects and actions meet all three criteria and are therefore included in Alternative 1 – No Action:

- Interim juvenile fish passage facility and operations currently in place at Cle Elum Dam, including reconstruction of the facilities
- Ongoing fish reintroduction at Cle Elum Reservoir and upper Cle Elum River
- Construction and operation of permanent fish passage facilities at Cle Elum Dam
- Yakima River Basin Water Enhancement Project (YRBWEP) Phase II water conservation, and land and water rights acquisition program

2.3.1.1 Interim Juvenile Fish Passage Facilities

Reclamation constructed an interim fish passage facility on the spillway of Cle Elum Dam in spring 2005, under authority of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Title XII, Yakima River Basin Water Enhancement Project. The wooden structure has provided downstream passage for juvenile fish, but is falling into disrepair. Reclamation plans to reconstruct it and continue operating the interim facility until permanent fish passage facilities are completed (Section 2.3.1.3). Having completed the NEPA Categorical Exclusion Checklist for reconstruction of the interim fish passage facility in June 2014 (Reclamation, 2014d), Reclamation plans to start construction in June 2015, following the spring outmigration. Construction will take place entirely on the existing dam spillway; therefore, Reclamation anticipates no substantial adverse impacts from the reconstruction effort. The completed interim fish passage facility will operate in the same way as the existing facility.

2.3.1.2 Ongoing Fish Reintroduction at Cle Elum Reservoir and Upper Cle Elum River

The interim fish passage facilities have allowed the Yakama Nation to reintroduce coho, sockeye, and spring Chinook salmon upstream of Cle Elum Dam, as described in The *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project EIS* (Reclamation and Ecology, 2011b). The fish reintroduction using the interim juvenile fish passage facilities is included as the existing condition for fish as described in Section 3.6.

2.3.1.3 Permanent Fish Passage Facilities at Cle Elum Dam

Based on the environmental analysis in *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project EIS* (Reclamation and Ecology, 2011b), Reclamation identified Alternative 3 – Right Bank Juvenile Passage with Right Bank Adult Passage without Barrier Dam as the Preferred Alternative. Reclamation’s Technical Service Center has conducted additional design on the proposed facilities, which include the following:

- Downstream passage facilities –a multilevel intake structure, helical transition structures, and a conduit through the right abutment of the dam (right refers to the observer facing in the downstream direction). The conduit would discharges flows into the spillway stilling basin, located upstream from the existing spillway inlet channel.
- Upstream adult fish passage facilities –a fish ladder, adult holding pool, lock sampling facilities and direct truck loading capabilities would be located immediately downstream from the spillway stilling basin on the right bank. The facilities would include a splitter wall to reduce circulation flow and a single ladder entrance with attraction flow.

The changed design and facility are described and evaluated in the *Cle Elum Dam Fish Passage Facilities Design Summary Update* (Reclamation, 2015a). Reclamation will construct the fish passage facilities in phases. Phase 1, which includes access roads and a new bridge over the Cle Elum Dam spillway, is scheduled to start in fall 2015.

2.3.1.4 YRBWEP Phase II

The Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (108 Stat. 4550 USC), commonly referred to as YRBWEP Phase II, provides for a water conservation program with joint Federal and State funding coupled with local matches. The program provides economic incentives to implement structural and nonstructural water conservation measures. As required by the legislation, a Conservation Advisory Group and Reclamation completed a *Basin Conservation Plan* in 1998 (Yakima River Basin Conservation Advisory Group, 1998). Implementation of conservation measures identified in the plan is ongoing. Alternative 1 – No Action includes those conservation measures currently being implemented. The *Basin Conservation Plan* also includes limited provisions to acquire land and water rights, whether on a permanent and temporary basis, to improve instream flows.

Two ongoing YRBWEP Phase II projects fit the criteria noted at the beginning of Section 2.3.1 (i.e., planned, designed, funded, and scheduled):

- Roza Irrigation District Reregulation Reservoir, which would conserve 8,584 acre-feet annually when construction is completed and operations begin in 2016
- Sunnyside Division Board of Control Phase IIB Enclosed Lateral Improvement Projects, which would conserve 6,461 acre-feet annually when construction is completed and operations begin in 2032

2.4 Proposed Action (Alternative 2) – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection

Reclamation proposes to increase the storage capacity of Cle Elum Reservoir by 14,600 acre-feet, dedicating the accrued water to instream flow needs, as authorized in the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP) (108 Stat. 4550 USC). Reclamation would implement a rock shoreline protection strategy to reduce the potential for increased shoreline erosion due to the higher water level. Construction would occur over several seasons during a period of approximately 5 years. Reclamation would not initiate use of the increased capacity until all shoreline protection is completed.

The Proposed Action includes the following major components:

- Modify the existing Cle Elum Dam spillway radial gates to increase the reservoir capacity by 14,600 acre-feet, resulting in inundation of some shoreline areas not previously inundated (Section 2.4.1)
- Dedicate the accrued water to instream flows (Section 2.4.2)
- Install rock shoreline protection to stabilize shorelines adjacent to private property subject to increased erosion from the higher reservoir pool (Section 2.4.3)
- Monitor shoreline conditions and implement appropriate protection measures where necessary in conjunction with Reclamation's existing annual shoreline monitoring assessment (Section 2.4.3.5)

- Raise the elevation of three existing earthen saddle dikes north and east of the dam and raise the height of the right abutment of the dam to provide adequate freeboard[1] (Section 2.4.4)
- Provide shoreline protection for Federal property, including U.S. Forest Service (USFS) recreational facilities and access at Speelyi Beach Boat Launch and Day Use Area, Wish Poosh Campground and Boat Launch, Cle Elum River Campground, and portions of the west shoreline (Section 2.4.5)
- Provide erosion protection for portions of Salmon La Sac Road (Section 2.4.5.4)
- Acquire land, easements, or both from willing private sellers where necessary to accommodate shoreline protection (Section 2.4.3.4)
- Improve aquatic habitat at the mouths of three perennial streams on Federal lands along the west shore of Cle Elum Reservoir (Section 2.4.6)

2.4.1 Spillway Radial Gate Modifications to Increase the Reservoir Capacity

To increase the reservoir capacity, Reclamation would modify the five existing spillway radial gates by installing a 3-foot-high by 37-foot-wide fabricated steel extension on top of each gate (Figure 2-1), with flow diverters on top of each extension to funnel overtopping debris toward the middle of the gates (Figure 2-2). Reclamation would install a cover onto the downstream face of each gate to protect it from collecting debris[2].

2.4.1.1 Spillway Radial Gate Modifications Construction Activities

Modifications of the spillway radial gates would include minimal grading and gravel surfacing of the existing access road along the right dam abutment. Construction would occur in the dry, when reservoir levels are below the spillway floor. The expected construction duration is approximately 6 to 9 months, starting in the fall when reservoir levels are low. The construction sequence for modifying the radial gates would include the following:

- Install temporary erosion control measures on the access road and isolate the work area using plastic sheeting
- Sandblast the existing radial gates in place
- Install the new gate extensions

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[1] Freeboard is a factor of safety usually expressed in feet above a flood level. In this case, it is a 3-foot zone of additional protection from wave erosion.

[2] As a condition of Reclamation's Safety of Dam Program, additional instrumentation would be installed and the frequency of visual inspections of the facility would be increased before and after the 3-foot pool raise is implemented. If the monitoring were to show unacceptable seepage with the pool raise, the reservoir elevation would be lowered and additional modifications would be installed to address the issue.

- Install a nonreflective cover on the downstream face of the gates
- Weld steel reinforcement to the horizontal beams and trunnion arms
- Recoat the gates after structural welding is complete
- Replace the timber bottom and rubber side seals on each gate with similar materials

2.4.1.2 Increased Reservoir Capacity

Modifying the existing spillway radial gates would allow an additional 14,600 acre-feet of water to be stored in Cle Elum Reservoir in years when runoff is sufficient to accrue this additional amount, increasing the total reservoir capacity to 451,500 acre-feet. The higher reservoir pool would increase the area of inundation on the reservoir shoreline by approximately 46 acres, increasing its surface area at high pool to approximately 4,914 acres. Figures 2-3 through Figure 2-7 illustrate the difference between the existing high reservoir level at elevation 2,240 and the proposed higher reservoir level at elevation 2,243.

Figure 2-1. Existing Cle Elum Dam Spillway Radial Gates

Figure 2-2. Cle Elum Dam Spillway Radial Gate with Proposed Modifications

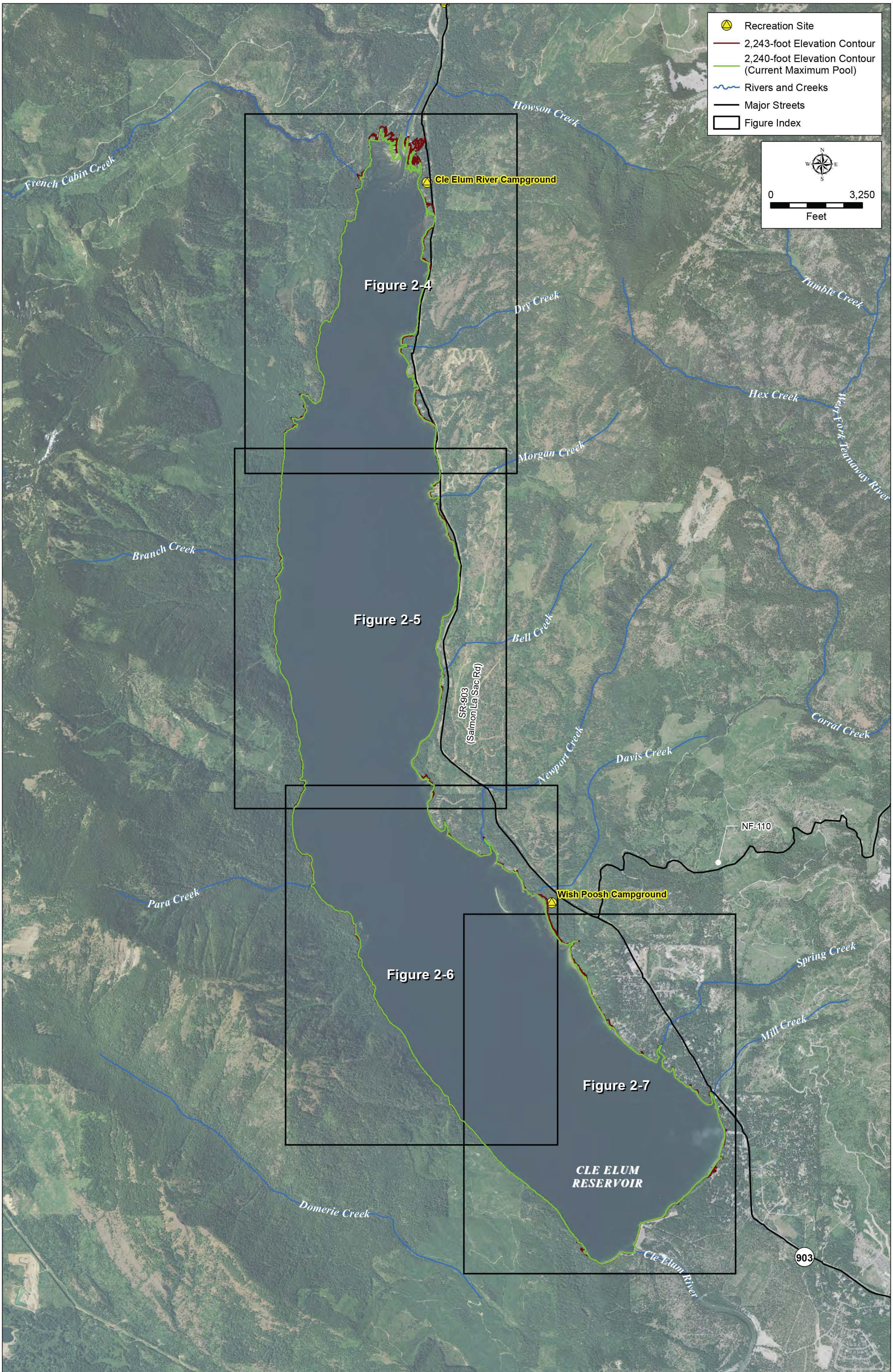

Figure 2-3. Project Area Overview

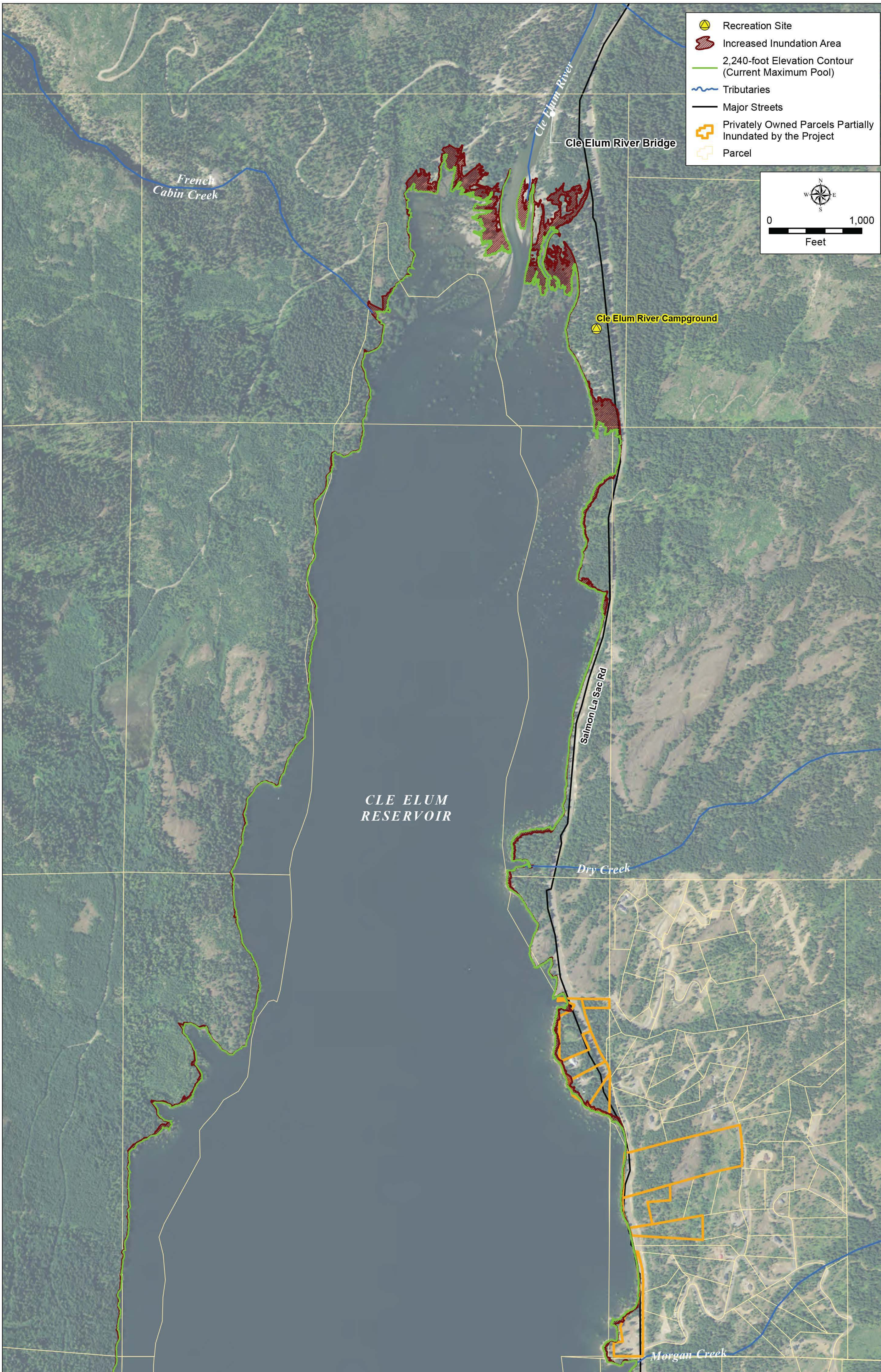

Figure 2-4. Project Area - North

Figure 2-5. Project Area - Southwest

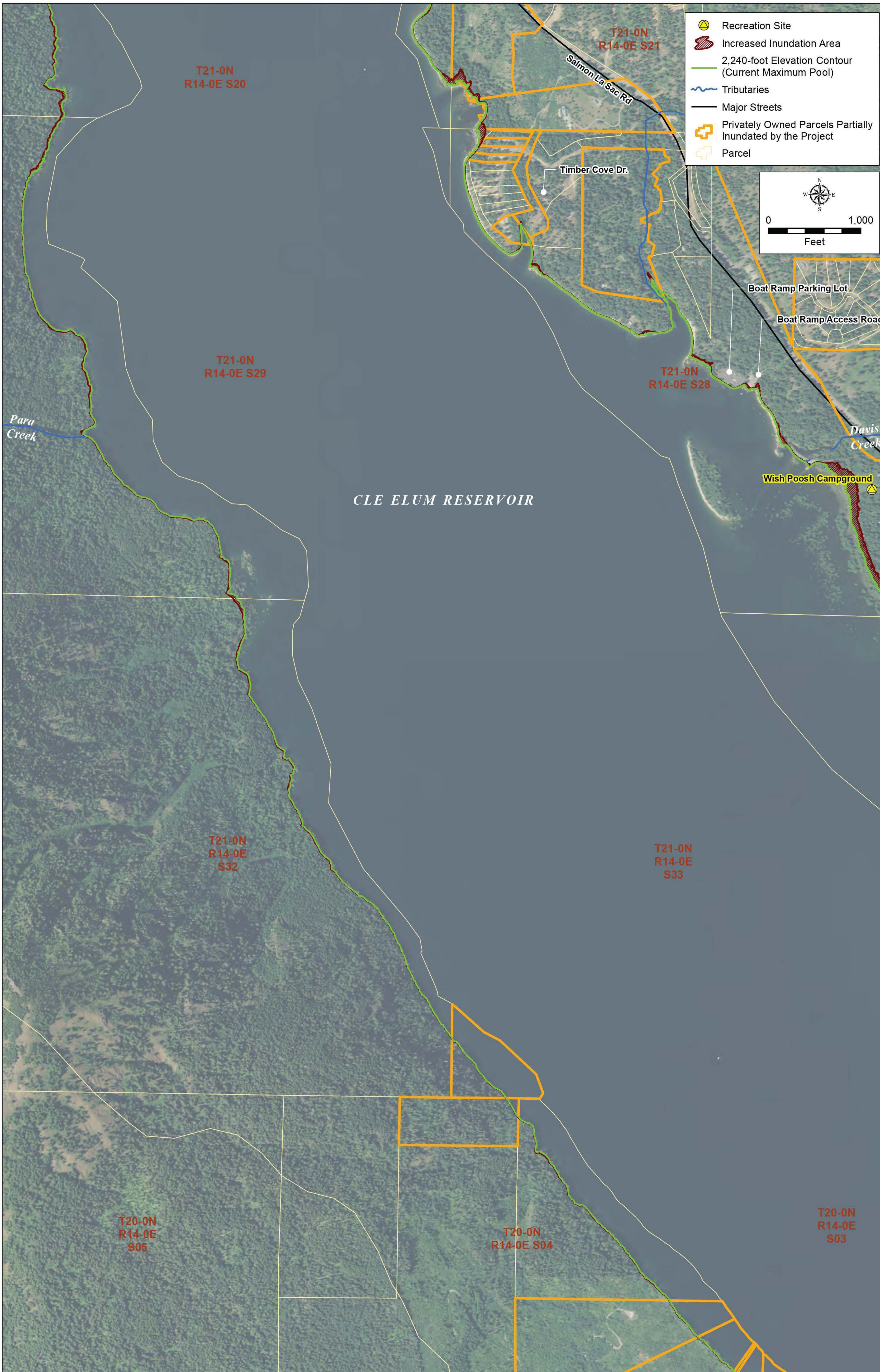

Figure 2-6. Project Area - Southeast

Figure 2-7. Project Area - South

2.4.1.3 Operations and Maintenance

Currently, operations and maintenance (O&M) activities on the spillway and radial gates include clearing debris from the spillway, inspecting the gates, testing gate mechanisms, and periodically recoating metal parts. Reclamation would perform the same O&M activities on the modified radial gates. However, the modified radial gates would be less prone to trapping debris, which would reduce the need for maintenance and corrosion removal.

2.4.2 Additional Storage Capacity for Instream Flows

Under the Proposed Action (Alternative 2), the accrued water in Cle Elum Reservoir would be used to improve instream flows in the lower Cle Elum River and in downstream reaches of the Yakima River. This use of water complies with the Cle Elum Pool Raise Project congressional authorization in YRBWEP Phase II. Section 1205(b) of the legislation dedicates the accrued water for instream flows, but allows flexibility in how Reclamation can use the water for that purpose. The legislation authorizes use of the water for “flushing flows or as otherwise advised by the System Operations Advisory Committee” (SOAC). Section 1205(b) of the legislation also states:

> *…Water may be carried over from year-to-year in the additional capacity to the extent that there is space available. Releases may be made from other Yakima Project storage facilities to most effectively utilize this additional water, except that water deliveries to holders of existing water rights shall not be impaired.*

Under Alternative 2, reservoir filling, storing, and downstream releases associated with the additional storage capacity would address instream flow needs identified in the technical memorandum Y*akima River Basin Study, Instream Flow Needs* (Reclamation and Ecology, 2011g). While SOAC would advise Reclamation regarding the timing and volume of accrued water to be released for instream flow purposes, Reclamation would retain operational responsibility for Cle Elum Reservoir. Reclamation must consider a number of factors when operating the reservoir including:

- Protection of spring outmigration flows in the Cle Elum and Yakima rivers when filling the additional storage capacity
- Effect on downstream flows when releasing the accrued water for instream flow needs
- Reservoir pool elevation and fish passage facility targets associated with both storing and releasing the accrued water
- Avoidance of effects on TWSA
- Existing flood control and safe dam operations

Reclamation would operate Cle Elum Reservoir to store the accrued water during spring and early summer, when high flows from snowmelt fill the reservoir. When available, the accrued water would be released as needed to supplement instream flows, to increase reservoir carryover (pool elevation), or both. Instream flow needs may change annually and over time in response to climatic conditions and the specific conditions of any given year. Therefore, the storage and release options identified below may be implemented in various combinations if sufficient accrued water is available and as long as the combination does not exceed 14,600 acre-feet or negatively impact TWSA, flood control, and safe dam operations. Reclamation would manage the accrued water with advice from SOAC[3]. The following operations may be implemented as part of Alternative 2:

- Increase the winter releases above minimum flows set by Reclamation as part of normal operations. This option would help address the high-priority instream flow need identified for the Cle Elum River to improve winter rearing conditions (Reclamation and Ecology, 2011g).
- Supplement releases to increase flow in the Cle Elum River and in downstream reaches of the Yakima River from mid-March through May to improve outmigration conditions for smolts and kelts.
- Strategically increase summer releases at times when additional flow from the mouth of the Yakima River to Sunnyside Dam could improve migration conditions for returning adult salmonids.
- Conserve or carry over the accrued water to the following year to meet pool elevation targets for the Cle Elum Dam fish passage facilities. Both interim and permanent fish passage facilities depend on meeting pool elevation targets before downstream passage can be provided.
- Once the necessary elevation has been reached for downstream fish passage, accrued water could be released to increase flow for outmigration. If sufficient runoff was available after this release to fill the existing Cle Elum Reservoir and the additional storage capacity, then water could once again be stored for future instream or fish passage needs.

2.4.3 Rock Shoreline Protection

Increasing the reservoir capacity would inundate approximately 46 additional acres of shoreline, a portion of which is privately owned, for an average of 40 days per year, primarily in June and July during years when runoff is available to fill the additional storage volume. Wave action from wind could cause increased erosion of the reservoir shoreline in some areas where additional inundation occurs.

Under the Proposed Action (Alternative 2), Reclamation would install rock shoreline protection adjacent to privately owned property identified as susceptible to erosion and inundation. Under this strategy, the primary method to protect shoreline banks would be rock riprap against the shoreline. Where banks are too steep or space is too narrow for placing rock riprap, Reclamation would install rock walls or gabion basket walls (wire baskets filled with cobbles and small boulders).

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[3] Appendix C contains SOAC’s concurrence with these proposals.

To avoid in-water work, Reclamation would construct all shoreline protection measures when the reservoir is drawn down, generally from August through September. The shoreline protection measures would be installed in phases around the reservoir and take approximately 5 years to complete protection for all areas. Reclamation would not initiate use of the increased capacity until all proposed shoreline protection is completed. Reclamation would conduct the appropriate environmental review and compliance if there are changes in the location or footprint of proposed shoreline protection or borrow sites.

2.4.3.1 Rock Shoreline Protection Methods

Based on analyses of inundation and erosion potential, Reclamation proposes to construct shoreline protection for approximately 16,900 feet of shoreline as listed in Table 2-1 and illustrated on Figure 2-8.

Table 2-1. Properties Proposed for Shoreline Protection

Approximate Location[1]	Length of Stabilization (feet)
Speelyi Beach Day Use Area and properties to the north, Mile 0.8 to Mile 1.3, including Washington State Department of Transportation pullout area	2,800
Sandelin Lane properties, Mile 1.5 to Mile 1.9	2,000
Domerie Bay Road properties, Mile 2.1 to Mile 2.6	2,000
Timber Cove Drive area, Mile 4.8 to Mile 5.4	3,200
Mile 5.7 to Mile 6.0	1,600
Mile 7.5 to Mile 7.8	1,500
Mile 8.1 to Mile 8.5	1,400
Properties along the southwest shoreline west of the dam, Mile 0.7 to Mile1.2	2,400

[1]Distance along the shoreline measured from Cle Elum Dam

Figure 2-8. Areas Proposed for Shoreline Protection

2.4.3.2 Rock Shoreline Protection Construction Activities

The rock walls constructed under the rock shoreline protection strategy would consist of large interlocking rock placed at a stable slope, usually 1-to-4 horizontal-to-vertical (H-to-V). Gabion baskets would be stacked on top of each other at a similar slope.

Prior to installing shoreline protection, Reclamation would clear and grub the area (remove stumps and roots to provide a firm surface for shoreline protection), and grade or fill the existing banks to a stable slope, usually 2-to-1 H-to-V or 3-to-1 H-to-V. Riprap would cover the slopes up to elevation 2,246. After construction, Reclamation would install native vegetation on exposed banks not covered by riprap. Reclamation would import rock material from a nearby offsite commercial quarry (approximately 15 to 30 miles from the reservoir). The specific quarry sources have not yet been confirmed. After identifying quarry source, Reclamation would conduct the appropriate environmental review and compliance for use of the quarry source. Reclamation has developed designs for rock shoreline protection for each section of shoreline proposed for stabilization, shown in Figure 2-8 (Reclamation, 2014b).

Table 2-2 shows the estimated amounts of clearing, excavation, fill, riprap protection, and other work to complete rock shoreline protection.

Table 2-2. Estimated Construction Quantities for Rock Shoreline Protection

Item	Estimated Quantity
Length of shoreline protection	16,900 feet
Clear and grub	21.7 acres
Cut	192,000 cy
Fill	53,000 cy
Riprap	45,000 cy
Geotextile	161,100 square yards
Restoration area	14.5 acres

2.4.3.3 Access Routes and Staging Areas

Reclamation would use only existing roads, cleared areas, and the dry reservoir bed for staging and access to construction sites. Existing roads used for access would be cleared if necessary to approximately 20 feet in width, graded, and surfaced with gravel or paving. Reclamation will coordinate with the landowner or public lands manager in all cases, and conduct the appropriate environmental review and compliance if new access roads, staging areas, or clearing are determined to be necessary.

2.4.3.4 Land Acquisition

Reclamation proposes to acquire fee title land or easements to install shoreline protection along certain private properties. For Alternative 2, Reclamation may need to acquire approximately 20 acres of land. Reclamation would only acquire land or easements from willing sellers. If property necessary for project completion cannot be acquired, Reclamation would develop options that may include avoidance or mitigation. Reclamation will conduct the appropriate environmental review and compliance prior to undertaking new or enhanced shoreline protection, changes in access, or land acquisition.

The shoreline protection measures would extend 25 to 50 feet shoreward of the ordinary high water mark (OHWM). The extent of acquired land would depend on the specific site and the design of shoreline protection for that site. The acquired land or easements would allow access to construct and maintain the shoreline protection.

2.4.3.5 Maintenance of Shoreline Protection

Actions to maintain shoreline protection measures may include revegetation, irrigation, weeding, spraying, and replacement of plants. Reclamation also would continue its current annual inspection of shoreline conditions as part of its *Standard Operating Procedures* and the *Directives and Standards* (Reclamation, 2001). The inspection includes photographing the shoreline from a boat in the early summer, noting any unusual conditions, and comparing the information to that from previous years. If comparison revealed changes to the shoreline, the Storage Program Manager would consult with Reclamation engineers and geologists to determine whether action to protect the shoreline is required and, if so, the appropriate follow-up with additional protection. Reclamation would coordinate with the landowner or public lands manager in advance and conduct the appropriate environmental review and compliance prior to undertaking new or enhanced shoreline protection.

2.4.4 Increase Freeboard of Saddle Dikes and the Right Dam Abutment

As part of constructing Cle Elum Dam, Reclamation constructed three saddle dikes in low areas at the south end of the reservoir. Saddle dikes are subsidiary dikes or dams constructed across a saddle or low point on the perimeter of a reservoir. The three saddle dikes provide freeboard and ensure impounded water and waves are contained within the reservoir during high reservoir levels and windstorms. The saddle dikes are located in a natural ridge that extends in a northeast direction from the main dam (Frontispiece and Figure 2-8). A portion of Saddle Dike 3 provides public access to the Speelyi Beach area.

Reclamation proposes to raise the crest elevation of the three saddle dikes by approximately 3 feet to elevation 2,253 and to raise a portion of the crest elevation of the right abutment of the dam. The higher elevation would provide additional freeboard for protection from wave-induced erosion; the pool itself would not reach this area. Reclamation would maintain the original crest widths and side slopes. Because these areas are located above the full reservoir pool level, construction could occur any time between spring and fall.

2.4.4.1 Saddle Dike 1

Reclamation would stabilize Saddle Dike 1 by placing a 30-inch-thick layer of riprap on the reservoir side of the dike. The riprap would require approximately 190 cubic yards (cy) of earth that would be excavated from a borrow area, transported, placed, and compacted on the saddle dike. The project would include the following components:

- Construct a new temporary access road roughly 330 feet long by 20 feet wide connecting to Cle Elum Dam Road.

- Clear approximately 0.75 acre of forest to provide access and a work area around the saddle dike.
- Create a borrow area approximately 250 feet by 100 feet located 900 feet west of the dam and 200 feet south of the reservoir (Figure 2-9). Reclamation would use this same borrow area for construction at Saddle Dikes 2 and 3 and the right dam abutment.
- Install erosion control measures around the perimeter of the staging area adjacent to the left dam abutment, access road, and work area.
- Stockpile existing riprap removed from above elevation 2,248 and trees larger than 18 inches in diameter for reuse on the saddle dike and for site restoration.
- Import new riprap via public roads, requiring less than 20 truckloads.

Anticipated construction equipment includes a bulldozer, excavator, dump trucks, skid steer, and a vibratory compactor. Construction would take less than 2 weeks. Upon completion of the project, Reclamation would mulch the disturbed areas and seed with a native grass mix. Site restoration would include placing salvaged trees across the work area and access road, and cutting the access road to make it impassable.

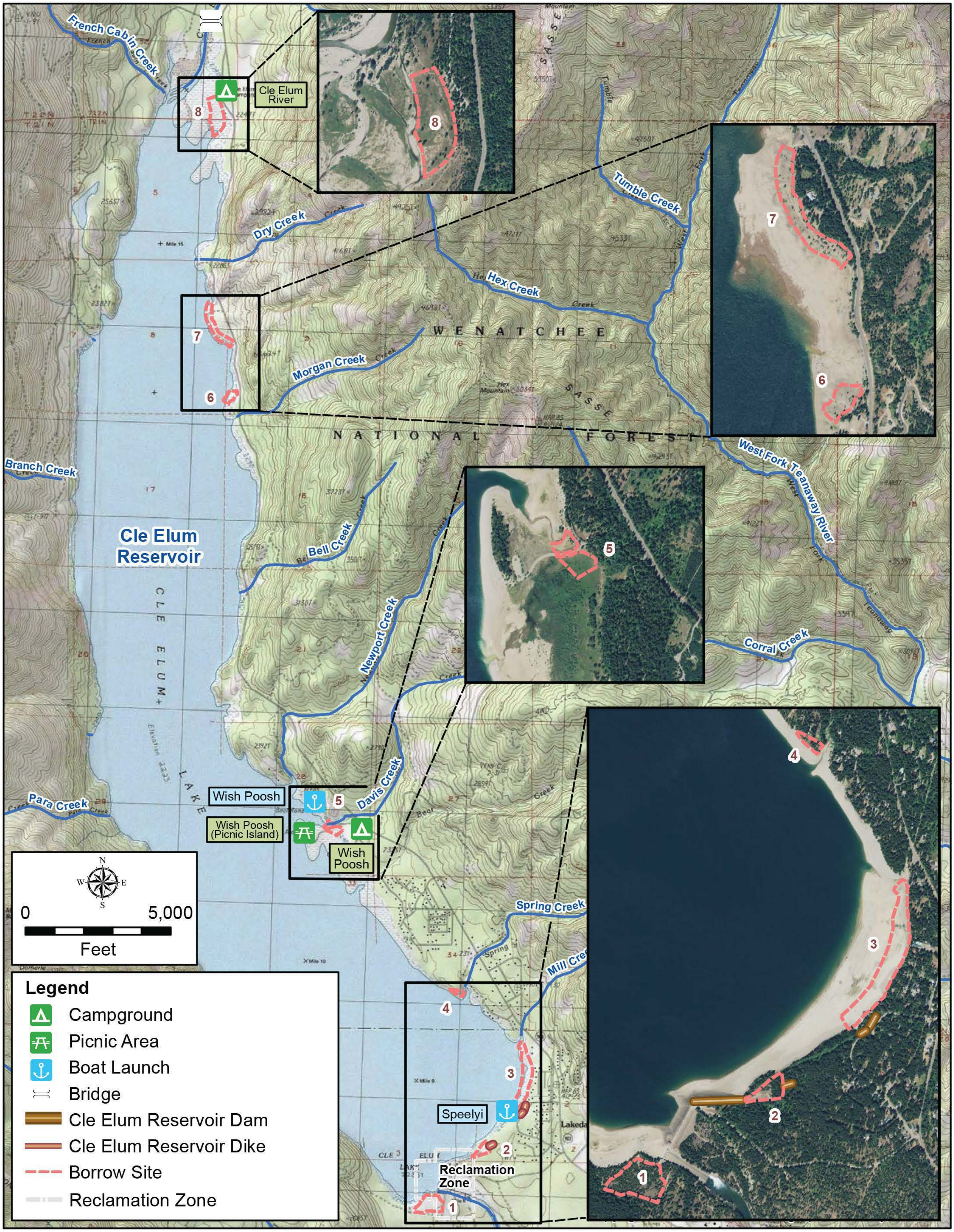

Figure 2-9. Borrow Areas

2.4.4.2 Saddle Dikes 2 and 3

Construction to raise Saddles Dikes 2 and 3 would occur concurrently. As part of the project, Reclamation would replace the existing Speelyi paved boat ramp at Saddle Dike 3 with a concrete boat ramp and repave the asphalt parking area in the Speelyi Beach Day Use Area. Construction would require closing Speelyi Beach Day Use Area for approximately 2 months starting after Labor Day and closing a portion of Lake Cabins Road for approximately 2 weeks during the same period. Alternative public access to the beach and residences would be maintained.

Raising Saddle Dikes 2 and 3 would include the following components:

- Clear approximately 1.6 acres of sparsely treed area to establish work areas around the two saddle dikes and a connection zone between the dikes
- Install erosion control measures around the perimeter of the work area
- Remove existing riprap from saddle dikes above elevation 2,248 and stockpile for reuse in raising the dikes
- Remove and dispose of approximately 150 cy of asphalt surfacing and ecology blocks (large cast concrete blocks) at the day use area, requiring approximately 15 truckloads
- Retain and protect trees outside the work area, including the large cottonwood trees to the west
- Remove and store informational signage
- Construct a new concrete boat ramp, requiring approximately 80 cy of cement
- Install asphalt paving in the day use area parking area and extend the asphalt to Lake Cabins Road, requiring approximately 90 tons of asphalt
- Install a gravel surface between the asphalt pavement and new portable toilets (see next paragraph)

In coordination with the USFS for relocation of utilities and services at Speelyi Beach, Reclamation would remove the existing vault toilets and replace them with either new vault toilets or portable toilets in a new location. If the latter, an enclosure would be constructed around them.

Raising the freeboard on Saddle Dike 2 and constructing the boat ramp and day use area would include excavating 780 cy of earth from the borrow area west of the dam, conveying that material to the site, and compacting it in place (Figure 2-9). Upon completion of the earthwork, the work area would be fine-graded and topped with approximately 180 cy of compacted aggregate base coarse gravel. Reclamation would install a 30-inch-thick layer of riprap on the slopes north and south of the boat ramp, requiring approximately 1,090 cy of riprap.

To raise the freeboard on Saddle Dike 3, Reclamation would install a 30-inch-thick layer of riprap on the reservoir side of the dike. Construction would require excavating approximately

430 cy of earth from the borrow area, conveying it to the site, and compacting it in place (Figure 2-9).

Anticipated construction equipment would include an excavator, dump trucks, cement mixers, asphalt trucks and pavers, skid steer, backhoes, front-end loaders, and vibratory compactors. When construction is complete, Reclamation would mulch and seed disturbed areas with a native grass mix and reinstall USFS informational signage.

2.4.4.3 Raise Sections of the Right Abutment of the Dam

Reclamation would raise low areas of the right abutment of the dam up to elevation 2,253 by constructing a berm extending west from the right wall of the dam spillway. The reservoir side of the berm would be armored with a 30-inch-thick layer of riprap and the top would be surfaced with gravel. Construction would require excavating approximately 3,600 cy of earth from the proposed borrow area west of the dam, transporting it to the site, and compacting it in place (Figure 2-9). Materials required include approximately 700 cy of riprap and 470 cy of gravel imported from offsite. The project would include the following components:

- Clear approximately 3.5 acres of forest to provide access and a work area
- Create a borrow area approximately 250 feet by 100 feet, approximately 900 feet west of Cle Elum Dam (the same borrow pit identified for construction of the Saddle Dikes) (Figure 2-9)
- Install erosion control measures around the perimeter of the staging area, access roads, and work area
- Stage equipment in an existing cleared area south of the spillway
- Utilize existing unimproved dirt road between the work and borrow areas

Construction equipment would include an excavator, dump trucks, skid steer, backhoes, front-end loaders, and vibratory compactors. Reclamation would mulch and seed the disturbed areas with native grasses.

2.4.5 Public Lands and Facilities Proposed for Shoreline Protection

Reclamation proposes to provide shoreline protection of public lands and to maintain existing access to and use of USFS recreation facilities. Reclamation developed the proposed shoreline protection in cooperation with the USFS. Construction in both Wish Poosh Campground and Boat Launch and Cle Elum River Campground would occur during the off-season between Labor Day and Memorial Day, when both facilities are closed.

2.4.5.1 West Shoreline

Portions of the west shoreline would need to be stabilized to mitigate impacts resulting from the increased reservoir capacity. Stabilization would occur in two general areas—along the south end of the west bank and at three stream mouths (Figure 2-8). At both areas, Reclamation would use onsite driftwood, trees, and vegetation as stabilization material. The trees would be placed generally parallel to the shoreline at the new high water mark and be anchored in place by the following methods:

- Attach steel cables to anchors epoxied into large boulders or bedrock
- Anchor to ballast logs/trees/rocks above the high water mark
- Construct anchors using local depressions and hand excavation

To reduce construction impacts, hand methods would be used (e.g., chainsaws, winches, ropes, and cables) to install the shoreline protection. No heavy machinery would be used, no additional materials would be imported, and no access road would be required.

2.4.5.2 Wish Poosh Campground

Reclamation proposes the following work at the Wish Poosh Campground:

- Raise the elevation of approximately 1,075 linear feet of the boat launch access road and stabilize the reservoir side of the road
- Stabilize portions of the boat launch parking lot and relocate the wellhouse access road
- Remove the water and electrical services to Picnic Island and the boat launch area

Construction to raise the boat launch access road includes the following components:

- Remove approximately 300 cy of asphalt surfacing
- Extend the Davis Creek culvert. Install a temporary cofferdam to isolate the work area and attach a culvert extension to the existing culvert
- Establish a work area extending approximately 20 feet from the toe of the road embankment
- Establish a 100-foot-by-100-foot borrow area on the reservoir bed, 600 feet south of the work area along the gravel road to Picnic Island using the existing gravel road for access between the work area and borrow area (Figure 2-9)
- Clear a total of approximately 1.9 acres of treed area, including areas approximately 10 to 20 feet on the side of the road and the extent of the borrow area
- Salvage and stockpile existing riprap from the road embankment
- Install temporary erosion control measures around the perimeter of the work area, access roads, and borrow area
- Excavate earth from the borrow area to raise the level of the road and compact the material on the landward side of the road
- Install asphalt paving and tie paving into existing pavement using 230 cy of gravel base and 180 tons of asphalt

- Install a 24-inch-thick layer of riprap on the reservoir side between elevations 2,238 and 2,247 to protect the roadway embankment from erosion, using approximately 820 cy of riprap

Reclamation proposes the following work to relocate the access road to the wellhouse in Wish Poosh Campground:

- Clear a treed area above the existing reservoir high water line, approximately 16 feet wide and 100 feet long
- Grade a road through this area and top it with gravel brought in from a commercial source (specific sources not yet been confirmed)
- Install an access gate at the new road and make the existing access road impassable

Reclamation would undertake the following activities in the boat launch parking lot and at Picnic Island:

- Remove and dispose of the existing stairways. Install a 24-inch-thick layer of rock riprap at the location of the removed stairs
- Remove an existing street lamp at the boat launch area
- Retain and protect vegetation on the south side of the parking lot
- Remove asphalt paving on the edge of the parking lot and install a new concrete parapet wall footer and a wall with a Cascadian-theme and grouted stone fascia
- Backfill the wall and patch the asphalt paving

Reclamation would coordinate construction with the USFS on the relocation of utilities and services at the campground. Reclamation would remove the water and electrical services to Picnic Island and the boat launch area. The existing toilets at Picnic Island would be removed and replaced with either new vault toilets or portable toilets in a new location. If portable toilets are installed, an enclosure would be constructed around them.

The anticipated types of construction equipment at the site would include an excavator, dump truck, asphalt trucks and pavers, skid steer, backhoe, front-end loader, and vibratory compactor. Reclamation would reseed and mulch disturbed areas using a native grass mix. Construction at Wish Poosh Campground would last approximately 1 month.

2.4.5.3 Cle Elum River Campground

At Cle Elum River Campground, Reclamation proposes to construct improvements to protect five campsites (Sites 1, 2, 3, 9, and 12) and two vault toilets north of Site 9, which would be inundated by the higher reservoir level. To protect the campsites from wave action, Reclamation would construct a berm on the south side of the campground along the shoreline and connect it to the existing road embankment. Reclamation would coordinate with the USFS to ensure that toilets at the campground are protected from higher water. Reclamation would remove the existing vault toilets and replace them with either new vault toilets or portable toilets in a new location. If portable toilets are installed, an enclosure would be constructed around them. Construction of the berm would include the following components:

- Clear and grub trees and vegetation from the berm area (approximately 0.7 acres), salvaging large trees
- Excavate a 3-foot-deep by 2-foot-wide trench along the shoreline and reuse the excavated material (roughly 250 cy) in the berm construction
- Clear vegetation from a borrow location in the reservoir bed (approximately 0.4 acres) (Figure 2-9)
- Excavate 1,400 cy of earth from the borrow site
- Construct a liner in the trench using imported impervious material, such as compacted select fill, bentonite, or a synthetic membrane
- Create a berm, using earth from the borrow site and compacting it in place in the trench (approximately 10 feet wide at the top with 2-to-1 H-to-V side slopes with a height less than 3 feet above adjacent grade)
- Install a protective cover that includes angular riprap, rounded cobbles, or topsoil with rooted plantings on the berm
- Install salvaged logs and large wood on the reservoir side of the berm
- Anchor the large wood to logs or large rocks using wire rope

Construction equipment would include an excavator, dump truck, mobile crane, skid steer, backhoe, front-end loader, and vibratory compactor. Reclamation would shape and contour the borrow site to match the existing ground, and mulch and seed disturbed areas with a native grass mix. Construction at Cle Elum River Campground would last 4 weeks or more.

2.4.5.4 Salmon La Sac Road Embankment

At the north end of Cle Elum Reservoir, an earthen embankment provides the base for portions of Salmon La Sac Road. Certain sections of the road would require additional riprap for protection from the higher reservoir level (Figure 2-8):

- A 1,000-foot-long section south of Carillon Cove Drive
- A 2,500-foot-long section between Morgan Creek Road and Night Sky Drive
- A 600-foot-long section near the south end of Cle Elum River Campground

Reclamation would install additional riprap to raise the elevation of the existing shoreline protection to 2,246. Access would be via the existing road, and construction equipment would operate from the existing road. Salmon La Sac Road would remain open during construction, with traffic restricted to a single lane. After excavators cleared and reshaped the embankment slope above elevation 2,240, Reclamation would place a 24-inch-thick layer of riprap. Approximately 5,000 cy of riprap would be trucked to the site from a commercial quarry source yet to be selected. Construction on Salmon La Sac Road would last approximately 2 months.

2.4.6 Improve Aquatic Habitat at Stream Mouths

Reclamation proposes to work with the USFS to improve aquatic habitat at the mouths of three perennial streams on Federal lands along the west shore of Cle Elum Reservoir. The incorporation of large wood into the shoreline will increase habitat complexity, provide cover, and improve microhabitat for rearing fish. The three streams to be treated are Para Creek, Branch Creek, and Two Coves Creek (Figure 2-8).

Habitat would be improved by anchoring logs in the reservoir bed between the high water mark and roughly 50 feet below the high water mark. The logs would be placed in the same general areas as the perennial streams, which would flow through the structures (depending on reservoir elevation). Logs could be felled directly into place, or dropped into the pool and floated to the site, where hand tools would be used for final placement and anchoring. Anchoring methods would include cabling to existing large rocks or bedrock, setting "deadmen" anchors[4], or ballasting with soil or other logs.

2.5 Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection (Preferred Alternative)

Under Alternative 3, Reclamation and Ecology would dedicate the accrued water for instream flows as described for Alternative 2, but would employ a hybrid shoreline protection strategy. Reclamation has identified Alternative 3 as the Preferred Alternative.

2.5.1 Spillway Radial Gate Modifications to Increase the Reservoir Capacity

Reclamation would implement the same spillway radial gate modifications, construction activities, and operations as described for the Proposed Action (Alternative 2), Additional Storage Capacity Used for Instream Flow with Rock Shoreline Protection (Section 2.4.1). Modifying the existing spillway radial gates would allow an additional 14,600 acre-feet of water to be stored in Cle Elum Reservoir, increasing its total capacity to 451,500 acre-feet, the same capacity for all action alternatives described in this FEIS.

2.5.2 Additional Storage Capacity for Instream Flows

Reclamation and Ecology would use the accrued water for instream flows as described for the Proposed Action (Alternative 2) (Section 2.4.2).

2.5.3 Hybrid Shoreline Protection

Under the hybrid shoreline protection strategy, Reclamation would protect the same shoreline areas as described for the Proposed Action (Alternative 2), Additional Storage Capacity Used for Instream Flow with Rock Shoreline Protection (Section 2.4.3.1). In addition to using rock walls where needed. Reclamation would include bioengineered shoreline protection, such as perched

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[4] "Deadmen" anchors consist of logs or concrete blocks buried in the ground as an anchor.

beaches, anchored logs, and other techniques described in Section 2.5.3.1. Reclamation has developed designs for each of these areas listed in Table 2-1.

Reclamation will conduct the appropriate environmental review and compliance if there are changes in the location or footprint of proposed shoreline protection or borrow sites.

2.5.3.1 Hybrid Shoreline Protection Methods

Reclamation would use some or all of the treatments described below in areas where increased shoreline erosion is expected. Section 2.5.3.2 below identifies the locations where these methods would be employed. Many of the treatments require the use of logs or rootwads. Reclamation would obtain these materials from its stockpile of trees removed from the reservoir or from its large stockpile of logs from all the Yakima Project reservoirs. If the stockpile is not adequate or if the stockpiled logs do not meet engineering standards, Reclamation would acquire additional logs.

- **Perched beach**. A perched beach consists of a band of compacted fill placed directly against existing slopes to create a new beach perched above the existing reservoir bed. Reclamation would use soils from the reservoir placed in a band roughly 50 to 100 feet wide and 3 to 6 feet thick. At slopes of 4-to-1 to 8-to-1 H-to-V, Reclamation proposes placing a cobble blanket of 3- to 6-inch rock on top of the fill. For slopes flatter than 8-to-1 H-to-V, no cobble blanket is proposed.

  This treatment is most suitable on shoreline areas with a stable, relatively flat beach slope. Perched beaches would replicate the variable slopes and materials found in natural beaches. On flatter beach slopes, the surface would be fine-grained sand and small gravel; on steeper slopes, the surface would be cobbles. Where drainages, natural topography, and constructed features permit, Reclamation would place shallower layers of fill and permit coves to develop. Figure 2-10 shows an example of how a perched beach placed against an eroding slope might look after construction.

Figure 2-10. Perched Beach

- **Conventional riprap.** Reclamation would dump or machine-place angular, broken rock against prepared slopes. Construction would include the following components:
    - Clear vegetation and organic material and grub roots
    - Grade and smooth slopes prior to placement of rock
    - Install a gravel or geotextile filter to prevent displacement of fine material behind the riprap layer
- **Riprap on vegetated slopes.** This treatment would involve selective clearing followed by machine placement of angular, broken rock around trees and trimmed shrubs. Only minimal grading of slopes would be required.
- **Rockery wall.** Reclamation would create a rockery wall by stacking large angular rock in an interlocking fashion; typical slopes range from 1-to-4 to 1-to-6 H-to-V. Walls would generally be 8 to 10 feet high (Figure 2-11).

Figure 2-11. Typical Rockery Wall

- **Anchored logs.** Anchored logs could include a variety of types, species, configurations, and combinations. Branches and rootwads of whole trees increase the ability to trap and retain sediment, as well as to break up wave energy. In some locations, Reclamation would use trimmed trees, as they are easier to transport. Logs may be placed either parallel or perpendicular to the shoreline. Parallel placement is more suitable where wave energy is low, such as in coves and inlets.
- **Log revetment**. Log revetment refers to logs and clusters of logs, placed perpendicular to the shoreline to break up focused wave energy or to protect a specific item of infrastructure. From its local stockpile, Reclamation would obtain logs of 18-inch minimum diameter and 30- to 90-foot length and anchor them in place.
- **Log terraces.** To create a log terrace, Reclamation would place rows of anchored logs parallel to the shoreline with cobbles or free-draining gravel behind each row of logs at

maximum 1-to-8 H-to-V slope. Figure 2-12 illustrates an example of a short log terrace supporting a slope.

Figure 2-12. Example of a Log Terrace

Reclamation would use some or all of the following treatments in areas with moderate to low wave energy, defined as areas that are sheltered from wind-driven waves and with fetch less than 2.5 miles:

- **Slope reshaping**. Cut back existing near-vertical cliffs to a stable slope, typically 1.5-to-1 H-to-V or flatter.
- **Slash and soil.** Place alternating layers of small woody slash material (less than 3 inches in diameter with leaves or needles) and topsoil on the shore, using excavator teeth to break up the slash and work topsoil material into it.
- **Fell and anchor.** Fell whole trees above the erodible slope and anchor them to stable locations, such as stumps, bedrock, or existing trees, located above the extent of erosion. Tree branches and needles would cover the soil, prevent soil particles from dislodging, and retain dislodged particles.
- **Live brush treatment**. Alternate layers of live branches and compacted backfill.
- **Seeding.** Dry broadcast or hydroseed exposed slopes with native plant seeds.
- **Rooted planting.** Install rooted plants on slopes.
- **Live staking.** Install live, woody cuttings into the soil to root, grow, and create a living root mat that stabilizes the soil by reinforcing and binding soil particles together, and by extracting excess soil moisture.
- **Fascines**. Bind dormant branch cuttings together into long sausage-like bundles, place them in shallow trenches, and cover them with topsoil. Allow the cuttings to sprout and grow.

- **Fabric-encapsulated soil lifts**. Place alternating layers of live branch cuttings and compacted soil with natural or synthetic geotextile wrapped around each soil lift.
- **Erosion control fabric**. Secure erosion control fabric to the ground using metal or wooden stakes. Fabric is typically composed of natural loose material, such as straw, jute (vegetable fiber), or coir (coconut husk fibers), sandwiched between netting. Netting may be jute, woven coir, or polypropylene.
- **Coir logs and straw wattles.** Place cylindrical structures composed of natural coconut husk fibers or straw bound together with jute, coir, or polypropylene netting on the ground. The structures trap sediment, which encourages plant growth within the log or wattle.

2.5.3.2 Hybrid Shoreline Protection Construction

Reclamation has developed designs for hybrid shoreline protection for each section of shoreline proposed for stabilization and listed in Table 2-1 (Reclamation, 2014b). The following bullets summarize the proposed hybrid shoreline protection strategies, along with the associated construction activities for each site.

- **Speelyi Beach, Mile 0.8 to Mile 1.3.** Reclamation would construct a series of perched beaches along roughly 2,800 feet of shoreline between the Speelyi Beach Day Use Area and the Washington State Department of Transportation (WSDOT) pullout. Minor drainages, including Mill Creek, would form natural separations between the perched beaches. Within the low areas and drainages, Reclamation would install anchored rootwad logs and cluster some of the rootwad logs into revetments. Once the earthwork is completed, Reclamation would place driftwood salvaged from the construction area on the perched beaches and in the coves. Reclamation would revegetate the beach area above the new high water line with native plants. West of the WSDOT pullout, the earthwork would cause the alignment of a minor ephemeral drainage to shift to the north.
- **Sandelin Lane, Mile 1.5 to Mile 1.9.** Along the shoreline adjacent to Sandelin Lane, Reclamation would construct 2,000 feet of rockery wall against the existing shoreline scarp in four discontinuous sections. A riprap blanket extending roughly 20 feet from the wall would protect the reservoir side of the rockery wall. The riprap blanket would consist of 30-inch riprap, 3 feet thick, at a 2-to-1 slope H-to-V. Anchored rootwad logs arranged in terraces would protect natural low areas and drainages.
- **Domerie Bay Road, Mile 2.1 to Mile 2.6.** Along the shoreline adjacent to Domerie Bay Road, Reclamation would construct 2,000 feet of shoreline protection in three discontinuous sections. Construction would include log terraces and a perched beach at the north end. The perched beach would extend roughly 500 feet in length and 100 to 200 feet behind the existing high water line.
- **Timber Cove Drive, Mile 4.8 to Mile 5.4.** Reclamation would install approximately 3,200 feet of rootwad shoreline protection.
- **Mile 5.7 to Mile 6.0.** Reclamation would install approximately 1,600 feet of rootwad shoreline protection.

- **Mile 7.5 to Mile 7.8.** Reclamation would install approximately 1,500 feet of perched beach shoreline protection.
- **Mile 8.1 to Mile 8.5.** Reclamation would install approximately 1,400 feet of perched beach shoreline protection.
- **Properties along the southwest shoreline, Mile 0.7 to Mile 1.2.** Reclamation would install approximately 2,400 feet of rootwad shoreline protection.

Reclamation would construct all hybrid shoreline protection in the dry, when the reservoir is drawn down. Silt fence, straw wattles, and other measures installed around the perimeter of the staging areas, borrow areas, access roads, and work area would control erosion at the work sites. Trucks would haul imported large rocks, quarry spalls, and riprap via public roads. Commercial sources of materials and haul routes have not yet been confirmed. Heavy equipment to perform the work is likely to include an excavator with a thumb, dump trucks, skid steer, backhoes, front-end loaders, and vibratory compactors.

The following bullets describe construction activities associated with the three most common hybrid shoreline protection techniques:

- **Perched beaches.** Reclamation would locate the borrow areas, work areas (roughly 120 feet wide, extending from the current high water line into the reservoir bed), staging area, and access roads on the reservoir bed near the construction sites. Construction of the perched beaches would involve the following components:
  - Clear areas on the reservoir of organic material and obstructions
  - Excavate sand and gravel from the borrow area, and place and compact it on the shoreline, using trucks or scrapers
  - Place and anchor rootwad logs using an excavator
  - Spread stockpiled driftwood on top of the new fill and install container plantings at the new high water line
- **Rockery walls.** In some areas, equipment may need to operate from the top of the slope to perform this work. Construction of the rockery walls would involve the following components:
  - Clear and grub a work area roughly 30 feet wide along the rockery wall alignment. This activity would mainly involve removing hazardous trees
  - Salvage and stockpile trees larger than 18 inches in diameter
  - Retain major structures at the top of the eroding slope
  - Remove existing landscaping features, such as rock terraces, retaining walls, and beach access stairs, as needed
  - Shape and grade existing banks to a 1-to-1 H-to-V slope, and deposit the excavated material on the reservoir bed
  - Stack large rocks in an interlocking fashion at the toe of the graded slopes and backfill with quarry spalls

    - Place riprap in a 30-inch layer at the toe of the rockery wall
- **Log terraces.** Construction of the log terraces would involve the following components:
    - Install ecology blocks (large cast concrete blocks used for retaining walls) or other suitable anchors in terraces between elevations 2,240 and 2,243
    - Secure rootwad logs to the anchors
    - Place uncrushed 3-inch to 6-inch cobbles between the logs
    - Mulch disturbed areas and seed with a native grass mix

Table 2-3 lists estimated quantities needed for construction activities.

Table 2-3. Estimated Construction Quantities for Hybrid Shoreline Protection

Item	Estimated Quantity
Length of shoreline protection	16,900 feet
Clear and grub	30.1 acres
Cut	195,000 cy
Fill	215,000 cy
Riprap	5,200 cy
Geotextile	9,100 square yards
Large rock	3,100 cy
Quarry spalls	3,600 cy
Restoration area	19.5 acres
Rootwad logs	2,606

2.5.3.3 Access Routes and Staging Areas

Access roads would be similar to those described in Section 2.4.3.3 for Rock Shoreline Protection. Reclamation will conduct the appropriate environmental review and compliance if new access roads, staging areas, or clearing are determined to be necessary.

2.5.3.4 Land Acquisition

As described in Section 2.4.3.4, Reclamation proposes to acquire fee title land or easements from willing sellers to install shoreline protection along private property. For Alternative 3, Reclamation may need to acquire approximately 20 acres of land. If Reclamation cannot acquire property necessary for project completion, it would develop options that may include avoidance or mitigation. Reclamation will conduct the appropriate environmental review and compliance prior to undertaking new or enhanced shoreline protection, changes in access, or land acquisition.

2.5.3.5 Maintenance for Shoreline Protection

The maintenance for shoreline protection would be the same as described for the Proposed Action (Alternative 2) (Section 2.4.3.5).

2.5.4 Increase Freeboard of Saddle Dikes and the Right Dam Abutment

Reclamation would raise the crest elevation of the three saddle dikes and right dam abutment by approximately 3 feet to elevation 2,253. Reclamation also would raise low areas of the right abutment of the dam using the same approach and construction activities as described for the Proposed Action (Alternative 2), Additional Storage Capacity Used for Instream Flow with Rock Shoreline Protection (Section 2.4.4).

2.5.5 Public Lands and Facilities Proposed for Shoreline Protection

Shoreline protection of public lands and facilities would be the same as described for the Proposed Action (Alternative 2) (Section 2.4.5).

2.5.6 Improve Aquatic Habitat at Stream Mouths

Reclamation would coordinate with the USFS to improve aquatic habitat at the mouths of Para Creek, Branch Creek, and Two Coves Creek, using the same methods as described for the Proposed Action (Alternative 2) (Section 2.4.6).

2.6 Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection

Under Alternative 4, Reclamation and Ecology would dedicate the accrued water for TWSA. This alternative would require additional authorization from Congress in order to allow uses of the water for purposes other than instream flow. Alternative 4 would employ the same Rock Shoreline Protection strategy described for the Proposed Action (Alternative 2) (Section 2.4.3).

2.6.1 Spillway Radial Gate Modifications to Increase the Reservoir Capacity

The proposed spillway radial gate modifications, construction activities, and operations and maintenance would be the same as described for the Proposed Action (Alternative 2) (Section 2.4.1). Modifying the existing spillway radial gates would allow an additional 14,600 acre-feet of water to be stored in Cle Elum Reservoir, increasing its total capacity to 451,500 acre-feet, as for all other action alternatives.

2.6.2 Additional Storage Capacity Used for TWSA

Under Alternative 4, Reclamation and Ecology would dedicate the accrued water as part of TWSA for proratable irrigation districts or instream flows. TWSA is a measure of water supply that Reclamation uses to allocate water in the Yakima River basin (see Section 1.4.2).

Reclamation interprets TWSA to mean the total water supply available for the Yakima River basin for the period April through September above the U. S. Geological Survey (USGS) gage at Parker referred to as “Parker gage,” located below Union Gap and the Sunnyside Diversion Dam. This interpretation is expressed in a mathematical formula:

April 1 through July 31 forecast of runoff
\+ August 1 through September 30 projected runoff
\+ April 1 reservoir storage contents
\+ Usable return flow upstream from Parker gage
= TWSA

TWSA provides an estimated total water volume available for use in determining the instream flow targets for each year. The total demand on TWSA for irrigation, regulation, and flows passing Parker gage averages 2.7 million acre-feet (including Title XII target flows) in a normal year. The Title XII target flows refer to the flow targets established through the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434, 108 Stat. 4550 USC). Reclamation determines these target flows each year. Depending on TWSA for that year, the target flows range from 300 cfs to 600 cfs. Reclamation manages the flow targets at Sunnyside and Prosser diversion dams on the Yakima River downstream from Yakima by releases of water from its five reservoirs.

An increase in TWSA may result in an increase in minimum flows past Parker gage and Prosser Dam per Title XII Target Flows (Table 2-4). However, hydrologic modeling predicts that circumstance would occur infrequently, in about 5 percent of the years modeled, because the volume of accrued water in Cle Elum Reservoir would be small (14,600 acre-feet) compared to the incremental increase in TWSA that triggers greater target flows (250,000 acre-feet). For that reason, Reclamation would use the accrued water to supply proratable water users during a drought if the water is available.

Table 2-4 summarizes the Title XII target flows based upon TWSA. See Section 3.3.4.1 of the Integrated Plan PEIS for additional information (Reclamation and Ecology, 2012).

Table 2-4. Title XII Target Flows

TWSA (million acre-feet)				Parker and Prosser Flows (cfs)	Title XII Minimum Flow Past Parker Gage July-September Demand (acre-feet)
Apr-Sept	May-Sept	Jun-Sept	Jul-Sept		
3.20	2.90	2.4	1.9	600	117,000
2.90	2.65	2.2	1.7	500	100,000
2.65	2.40	2.0	1.5	400	84,000
Less than above TWSA				300	68,000

Source: Reclamation and Ecology, 2012

Reclamation, in consultation with SOAC, would manage the accrued water to help meet the goals of the Integrated Plan, which include providing more reliable and sustainable water resources for the health of the riverine environment and for agricultural, municipal, and domestic water users.

If Reclamation dedicates the accrued water to TWSA for use by proratable irrigation districts during drought years, the accrued water would be carried over from year to year until a drought occurs.

2.6.3 Rock Shoreline Protection

The shoreline protection strategies would be the same as described for the Proposed Action (Alternative 2), Additional Storage Capacity Used for Instream Flow with Rock Shoreline Protection (Section 2.4.3).

2.6.4 Increase Freeboard of Saddle Dikes and the Right Dam Abutment

Reclamation would raise the crest elevation of the three saddle dikes by approximately 3 feet to elevation 2,253, and raise low areas of the right abutment of the dam using the same approach and construction activities as described for the Proposed Action (Alternative 2), Additional Storage Capacity Used for Instream Flow with Rock Shoreline Protection (Section 2.4.4).

2.6.5 Public Lands and Facilities Proposed for Shoreline Protection

Shoreline protection of public lands and facilities would be the same as described for the Proposed Action (Alternative 2) (Section 2.4.5).

2.6.6 Improve Aquatic Habitat at Stream Mouths

Reclamation would coordinate with the USFS to improve aquatic habitat at the mouths of Para Creek, Branch Creek, and Two Coves Creek, using the same methods as described for the Proposed Action (Alternative 2) (Section 2.4.6).

2.7 Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection

For Alternative 5, Reclamation and Ecology propose to dedicate the accrued water to TWSA as described for Alternative 4, but they would employ the hybrid shoreline protection strategy as described for Alternative 3. This alternative would require additional authorization from Congress.

2.7.1 Spillway Radial Gate Modifications to Increase the Reservoir Capacity

The proposed spillway radial gate modifications, construction activities, and operations and maintenance would be the same as described for the Proposed Action (Alternative 2) (Section 2.4.1). Modifying the existing spillway radial gates would allow an additional 14,600 acre-feet of water to be stored in Cle Elum Reservoir, increasing its total capacity to 451,500 acre-feet, as for all other action alternatives.

2.7.2 Additional Storage Capacity Used for TWSA

The description of the accrued water dedicated to TWSA is the same as described for Alternative 4 (Section 2.6.2).

2.7.3 Hybrid Shoreline Protection

The hybrid shoreline protection would be the same as described for Alternative 3 (Section 2.5.3).

2.7.4 Increase Freeboard of Saddle Dikes and the Right Dam Abutment

Reclamation would raise the crest elevation of the three saddle dikes by approximately 3 feet to elevation 2,253, and raise low areas of the right abutment of the dam using the same approach and construction activities as described for the Proposed Action (Alternative 2), Additional Storage Capacity Used for Instream Flow with Rock Shoreline Protection (Section 2.4.4).

2.7.5 Public Lands and Facilities Proposed for Shoreline Protection

Shoreline protection of public lands and facilities would be the same as described for the Proposed Action (Alternative 2) (Section 2.4.5).

2.7.6 Improve Aquatic Habitat at Stream Mouths

Reclamation would coordinate with the USFS to improve aquatic habitat at the mouths of Para Creek, Branch Creek, and Two Coves Creek, using the same methods as described for the Proposed Action (Alternative 2) (Section 2.4.6).

2.8 Comparison of Facilities for Shoreline Protection Alternatives

2.8.1 Comparison of Construction Materials and Facilities

Table 2-5 compares the major construction activities associated with the rock shoreline protection alternatives (Alternatives 2 and 4) and the hybrid shoreline protection alternatives (Alternatives 3 and 5) described in the sections above. Construction requirements are the same, whether the additional storage capacity is used for instream flow (Alternatives 2 and 3) or TWSA (Alternatives 4 and 5).

Table 2-5. Comparison of Estimated Construction Quantities for the Shoreline Protection Alternatives

Item	Estimated Quantities – Rock Shoreline Alternative	Estimated Quantities – Hybrid Shoreline Alternative
Length of shoreline protection	16,900 feet	16,900 feet
Clear and grub	21.7 acres	30.1 acres
Cut	192,000 cy	195,000 cy
Fill	53,000 cy	215,000 cy
Riprap	45,000 cy	5,200 cy
Geotextile	161,100 square yards	9,100 square yards
Large rock	---	3,100 cy
Quarry spalls	---	3,600 cy
Restoration area	14.5 acres	19.5 acres
Rootwad logs	---	2,606
Haul road construction	26,500 feet (5 miles)	26,500 feet (5 miles)

2.8.2 Comparison of Costs

Table 2-6 summarizes and compares the costs associated with the proposed alternatives, including the cost of modifying the radial gates, in 2014 dollars.

Table 2-6. Comparison of Estimated Cost of Shoreline Protection Alternatives

Project Component	Estimated Cost – Rock Shoreline Alternative	Estimated Cost – Hybrid Shoreline Alternative
Radial gate modification	$900,000	$900,000
Shoreline protection	$7,700,000	$7,400,000
Saddle dikes and right dam abutment	$405,000	$405,000
Recreational facilities and access	$896,000	$896,000
Land and easement acquisition	Not yet determined	Not yet determined
Total	**$9,901,000**	**$9,601,000**

2.9 Alternatives Eliminated from Detailed Study

Reclamation has evaluated a number of other alternatives for increasing the amount of storage in Cle Elum Reservoir. The alternatives include proposals to access the inactive storage (water stored in the reservoir below the outlet works) in the reservoir and proposals to increase the capacity of the reservoir.

2.9.1 Inactive Storage Proposals

Reclamation released a preliminary engineering report in 1984 that presented conceptual plans and summarized the options for accessing inactive storage at Cle Elum Reservoir (Reclamation, 1984b). Inactive storage is the volume of water in Cle Elum Reservoir that cannot be accessed because the water is below the level of the existing outlet works. One option was a tunnel leading from the reservoir to the Yakima River. Reclamation considered this option infeasible because of high cost (over $600 per acre-foot of water in 1984 dollars) (Reclamation, 1984b).

The second option to access the inactive storage was to install a pumping plant or pumps. Beyond concluding that the pumps and pumping plants would have high costs and aesthetic impacts, the preliminary engineering report questioned the reliability of the unproven pumping technology and determined that the equipment would be difficult to service and maintain (Reclamation, 1984b). For these reasons, Reclamation eliminated inactive storage proposals from future consideration.

2.9.2 Increased Storage Capacity Proposals

Reclamation also evaluated different options for increasing the capacity of the reservoir. All of these options focused on raising the level of the full pool elevation of the reservoir. The 1984 *Damsite and Structure Review Team Report* determined that it was possible to raise the reservoir elevation 2 to 3 feet without raising the dam, but raising the elevation by 10 to 15 feet would require raising the dam embankments and constructing new dikes (Reclamation, 1984a).

Reclamation concluded that the higher elevation increase (10 to 15 feet) would involve higher construction costs and more environmental impacts relative to the smaller increase in pool elevation. The 14,600-acre-foot increase in reservoir capacity corresponding to a 3-foot elevation raise would enable the accrual of water for increased instream flows, with minimal changes at the dam and fewer impacts on the adjacent shoreline and dam structure. Congress authorized the 3-foot pool raise as a project as part of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) Sections 1205 and 1206, Title XII, Yakima River Basin Water Enhancement Project (108 Stat. 4550 USC).

2.10 Summary Comparison of Environmental Impacts of Alternatives

Table 2-7 compares the impacts associated with the No Action Alternative and the four action alternatives. Chapter 4 provides additional information about potential impacts.

Table 2-7. Summary Comparison of Impacts

Surface Water			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No additional storage capacity would be available in Cle Elum Reservoir. Water supplies for proratable irrigators would continue to fall below 70 percent of entitlement during drought years. Instream flow conditions in the Cle Elum and Yakima rivers would not change.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Inundation of 46 additional acres of shoreline for an average of 39 days per year • Reservoir would reach full pool in 52 percent of years	• Additional storage would either increase the pool level for downstream outmigrants in spring or improve instream flow in the Cle Elum and Yakima rivers during winter, spring, or summer, providing significant benefits	• No impact on reservoir storage or releases
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	• Same as Alternative 2, except there would be an average of 40 days of additional inundation and the reservoir would reach full pool in 53 percent of years	• Additional storage would increase prorationing levels during drought years by a maximum of 1.6 percent, providing a minor significant benefit	Same as Alternative 2
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 4	Same as Alternative 4	Same as Alternative 3

Earth			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Shoreline erosion would continue as it does under existing conditions		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Increase in shoreline erosion where no shoreline protection is installed	• No change in potential for increased erosion downstream in the Cle Elum or Yakima rivers	• Short-term increase in erosion during construction
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Surface Water Quality			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Existing water quality trends would continue. Construction projects could cause temporary water quality impacts		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Construction would cause minor short-term increases in sediments, turbidity and nutrients, which would be minimized by best management practices • Project actions would not affect water quality conditions in Cle Elum Reservoir or in downstream reaches of the Cle Elum and Yakima rivers		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Groundwater			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction of projects included under the No Action Alternative would have no impacts on groundwater quality, water levels, or on-site septic systems (OSS) in the Cle Elum Reservoir area		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• No negative effects on water wells or groundwater levels are expected • Temporary higher groundwater levels could cause some OSS to fall out of compliance with county requirements	• No negative effects are anticipated	• Inadvertent spills during construction could decrease groundwater quality
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Fish			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Existing low-flow conditions would continue to negatively impact fish in the Cle Elum and Yakima rivers. Completion of permanent fish passage facilities at Cle Elum Dam would benefit fish by restoring ecological connectivity, biodiversity, and natural production of anadromous salmonids in the Cle Elum watershed above Cle Elum Dam		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• The increased reservoir level would temporarily increase erosion caused turbidity which would negatively impact fish • Erosion could increase nutrients in the reservoir, which would cause minor short-term increases in productivity and benefit fish • Inundation of shoreline vegetation would cause a short-term increase in habitat complexity that would benefit reservoir fish species by providing additional in-water structure	One of five instream flow scenarios would be implemented, each of which would have positive impacts on fish: • Scenario 1 would provide flow and habitat complexity improvements for salmonids • Scenario 2 would improve flow conditions during the smolt outmigration period • Scenario 3 would improve habitat connectivity for returning adult spawners • Scenario 4 would improve habitat connectivity for outmigrating juvenile salmonids • Scenario 5 would combine the benefits of Scenarios 2 through 4	• Construction would occur above the level where fish would be present and would not impact fish • Completed shoreline protection would not impact fish
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2 • A more natural riparian area would develop with hybrid shoreline protection, providing minor benefits to fish habitat

Fish			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2	• Existing low flows that currently impact fish in the Yakima and Cle Elum Rivers would continue	Same as Alternative 2
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 4	Same as Alternative 3

Vegetation and Wetlands			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction projects would not result in significant impacts on wetlands or vegetation. Ongoing trends in land management would continue to affect vegetation		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Inundation from the higher reservoir pool may impact wetlands and USFS Survey and Manage and other special status plant species, but no significant impacts are anticipated	• Use of additional storage capacity would not cause significant impacts on wetlands and vegetation downstream along the Cle Elum or Yakima rivers	• Construction and operation activities would result in insignificant impacts on wetlands and vegetation
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2, but the construction footprint would be slightly larger so impacts on wetlands and shoreline vegetation would be greater • A more natural riparian area would develop on hybrid shoreline protection
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2

Vegetation and Wetlands			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	Same as Alternative 3

Wildlife			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Patterns and trends of wildlife habitat that currently occur would continue. Fish passage projects at Cle Elum Reservoir would generate noise that would affect wildlife during construction but would ultimately benefit wildlife because of the new influx of nutrients from anadromous salmon carcasses.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Construction would result in minor short-term disturbance to wildlife • Operations would inundate a small amount of shoreline habitat (3 percent) that is not affected by current reservoir operations, the impact on priority species would not be significant	• Impacts to wildlife would not occur because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• Construction would cause a minor, short-term disturbance to wildlife • Shoreline protection projects would result in the loss of a narrow strip of habitat along the shoreline of the reservoir, but the loss would not impact the breeding, rearing, or foraging activities of priority species
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2 • Hybrid protection would create a more natural shoreline habitat
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	Same as Alternative 3

Threatened and Endangered Species			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Current trends would continue, which could result in detrimental long-term impacts to listed species. Completion of the fish passage facilities at Cle Elum Dam would benefit listed fish and terrestrial species.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• The increased reservoir level would temporarily increase erosion caused turbidity which would negatively impact bull trout • Erosion could increase nutrients in the reservoir, which would cause minor short-term increases in productivity and benefit bull trout • Inundation of shoreline vegetation would cause a short-term increase in habitat complexity that would benefit bull trout by providing additional in-water structure • Any habitat loss for northern spotted owl caused by the increased inundation would be offset by measures Reclamation will take to prevent further recreational dispersal and to restore Federal lands on the west side of the reservoir	• Increased instream flows would benefit bull trout and MCR steelhead downstream from Cle Elum Dam	• Construction could cause short-term disturbance of bull trout and northern spotted owl if present near the work area. • No long-term impacts are anticipated
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Similar to Alternative 2 • Hybrid shoreline protection would create a more natural shoreline habitat

Threatened and Endangered Species			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2	• Timing of flows released for TWSA would cause a negative impact on listed salmonids in the Yakima and Cle Elum rivers	Same as Alternative 2
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 4	Same as Alternative 3

Visual Quality			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Permanent fish passage facilities would be visible upstream of the dam, but would remain visually consistent with the overall setting		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Construction activities and equipment would cause short-term visual quality impacts • Dam modifications, shoreline protection, and reservoir pool changes would cause localized visual quality impacts that would not substantially contrast with the existing visual quality setting		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2	Same as Alternative 2	• Hybrid shoreline protection would create a more natural appearing shoreline
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 3		

Air Quality			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction would generate localized and short-term emissions but no exceedance of thresholds is anticipated		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	Minor emissions from construction would occur, but they would not violate any air quality standards or result in any air quality impacts		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Climate Change			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Projects constructed under the No Action Alternative would generate carbon emissions that would fall below Ecology's significance level. Completed fish passage facilities would improve conditions for salmonids under climate change conditions. Reduced flexibility for Reclamation to adapt water management in response to climate change.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Carbon emissions would fall below Ecology's significance level • Changes in runoff timing and volume associated with climate change would adversely impact the project by reducing the number of years the additional storage capacity would be available • Additional storage capacity would allow water managers somewhat more flexibility to respond to climate change • Positive benefit in instream flow or reservoir levels		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	• Carbon emissions would fall below Ecology's significance level • Changes in runoff timing and volume associated with climate change would adversely impact the project by reducing the number of years the additional storage capacity would be available • Additional storage capacity would allow water managers somewhat more flexibility to respond to climate change • Negligible benefit to prorationed irrigators		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 4		

Noise and Vibration			
Alternative	Spillway Radial Gate Modifications to Raise the Reservoir Level	Use of Additional Storage Capacity	Shoreline Protection
Alternative 1 – No Action	Construction activities would cause minor increases in noise		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Minor, temporary increases in noise and vibration during construction • No long-term noise impacts		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Recreation			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Projects included in the No Action Alternative would not result in adverse impacts on recreation. Ongoing dispersed camping and day use activities would continue to cause substantial degradation of the terrestrial, nearshore, and aquatic environments.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Dispersed recreation areas at Dry, Morgan, and French Cabin creeks would be inundated for approximately 40 days in years when additional storage capacity is used. Dispersed camping would be available in other areas around the reservoir • Opportunities to launch small watercraft downstream from the NF-4308 bridge would be reduced by inundation, but other boat launch locations would remain available • Installation of guardrails, proposed as mitigation for the impacts of dispersed camping, would permanently block vehicle-oriented dispersed recreation at the Dry Creek and French Cabin Creek areas, but recreationists would be able to walk into these areas and vehicle-oriented dispersed recreation would still be allowed in other areas	• A small increase in instream flows in the Cle Elum and Yakima rivers would not affect recreation because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• Installation of shoreline protection measures on private property could make access to shoreline more difficult. Reclamation would work with property owners to provide appropriate mitigation to the extent possible
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		

Recreation			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Land and Shoreline Use			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	The No Action Alternative would not impact land use.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• An additional 43 acres of Federal land and 3 acres of private property would be inundated; structures would not be affected • Additional inundation of the Cle Elum River where it enters the reservoir could affect designation of this portion of the river as a Wild and Scenic River	• Variations in instream flows would not affect land use because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• The acquisition of approximately 20 acres of land in narrow strips adjacent to the shoreline would not make private properties unsuitable for existing uses • Reclamation would acquire land only from willing sellers
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Utilities			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Permanent fish passage facilities would require a minor, insignificant increase in electricity use		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Reclamation would remove vault toilets at Speelyi Beach and Wish Poosh and Cle Elum River campgrounds and replace them with new vault toilets or portable toilets in a new location in coordination with the USFS • Reclamation would permanently remove the water and electrical services to Picnic Island and the boat launch area at Wish Poosh Campground in coordination with the USFS • No other utility interruptions are anticipated during construction		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Transportation			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	The No Action Alternative would not result in a notable increase in traffic levels		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Increases in construction vehicle traffic would be temporary and negligible • No roads or bridges would be inundated	• Fluctuations in flows downstream in the Cle Elum and Yakima rivers would not affect transportation infrastructure because fluctuations in streamflow would not be substantially different than those that have been experienced historically	• Increases in construction vehicle traffic would be temporary and negligible. • Lake Cabins Road would be closed for a period of less than 2 weeks. Alternative routes would be available. • Construction to increase shoreline protection on Salmon La Sac Road would temporary restrict traffic to one lane, but access would be maintained.
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Socioeconomics			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction of projects included in the No Action Alternative would result in minor direct increases in local employment. Prevailing economic factors would continue		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	The Proposed Action would result in a gain in regional economic activity. Construction would increase output in the short term. None of the impacts would be significant.		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Similar to Alternative 2, and use of additional storage capacity for TWSA would increase agricultural production and market value during severe drought years		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 4		

Cultural Resources			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	Construction of new permanent fish passage facilities would have an adverse effect on NRHP-eligible resources.		
Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection	• Modifications to the spillway radial gates would constitute a significant change to a historic structure (Cle Elum Dam) • The increased reservoir pool and associated shoreline protection measures would impact archaeological resources along the shoreline of Cle Elum Reservoir • The proposed action would contribute to the impacts on cultural resources, including traditional cultural properties (TCPs), caused by existing reservoir operations		
Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection	Same as Alternative 2		
Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection	Same as Alternative 2		
Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection	Same as Alternative 2		

Indian Sacred Sites			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No impact on Indian sacred sites is anticipated to occur because no sites have been identified in the area		
Alternatives 2 - 5	No impacts are anticipated under any of the action alternatives because no sites have been identified in the area		

Indian Trust Assets			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No impact is anticipated because no ITAs have been identified in the area		
Alternatives 2 – 5	No impacts are anticipated under any of the action alternatives because no ITAs have been identified in the area		

Environmental Justice			
Alternative	**Spillway Radial Gate Modifications to Raise the Reservoir Level**	**Use of Additional Storage Capacity**	**Shoreline Protection**
Alternative 1 – No Action	No impact is anticipated		
Alternatives 2 – 5	No disproportionate impacts to minority or low-income populations are anticipated under any of the action alternatives		

Chapter 3

AFFECTED ENVIRONMENT

CHAPTER 3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the environmental setting of Cle Elum Reservoir and the surrounding area. The chapter defines the area of impact analysis for each resource. The chapter also describes the environmental resources and resource uses potentially affected by the Proposed Action or alternatives. Chapter 4, Environmental Consequences, discusses potential effects. Photos 3-1 through 3-12 depict the environmental setting of Cle Elum Reservoir and the surrounding area.

Reclamation and Ecology obtained much of the background information in this chapter from the *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project Final EIS* (Reclamation and Ecology, 2011b) and the *Yakima River Basin Integrated Water Resource Management Plan Final Programmatic EIS* (Reclamation and Ecology, 2012). Unless otherwise noted, these documents are the sources of information for this chapter.

Photo 3-1. Cle Elum Reservoir (water level elevation 2,192.5)

Photo 3-2. Looking Northwest from Near Wish Poosh Campground (water level elevation 2,192.5)

Photo 3-3. Upper Cle Elum River

Photo 3-4. Looking West from Salmon La Sac Road at Upper End of Reservoir (water level elevation 2,192.5)

Photo 3-5. Looking Southeast to Dam from Near Wish Poosh Campground (water level elevation 2,192.5)

Photo 3-6. View from Speelyi Beach Boat Launch (water level elevation 2,192.5)

Photo 3-7. Wish Poosh Boat Launch (water level elevation 2,192.5)

Photo 3-8. USFS Signage at Dispersed Recreation Area

Photo 3-9. Cle Elum Dam Spillway and Temporary Fish Passage Flume

Photo 3-10. Looking Northwest from Salmon La Sac Road (water level elevation 2,192.5)

Photo 3-11. Looking Northeast to Cle Elum Dam near Baker's Road

Photo 3-12. Looking southeast from Cle Elum River Bridge

3.2 Surface Water Resources

This section describes the operation of Reclamation’s Yakima Project and Cle Elum Dam. Section 3.3.5 of the Integrated Plan PEIS (pp. 3-16 to 3-24, Reclamation and Ecology, 2012) describes the operation of the Yakima Project in detail. The following subsections focus on the operational requirements that determine the quantity of water retained in and released from Cle Elum Reservoir and the timing of those releases. The area of impact analysis for surface water is Cle Elum Reservoir and its surrounding shoreline (see Photos 3-1 and 3-2), including the delta where the upper Cle Elum River enters the reservoir; the Cle Elum River downstream of the reservoir (see Photo 3-3); and the Yakima River downstream from the Cle Elum River. River reaches discussed in this EIS are listed in Table 3-1 and depicted in Figure 3-1. The river mile location is measured as the distance in miles along the Yakima River starting from its mouth.

Table 3-1. River Reaches Discussed in EIS

Reach Name	Yakima River Mile Location	Length (miles)
Upper Yakima River	**214.5 to 127.9**	**86.6**
Yakima River from Keechelus Dam to Cle Elum River	214.5 to 185.6	28.9
Cle Elum River from Cle Elum Dam to Yakima River[1]	*185.6*	*8.2*
Yakima River from Cle Elum River to Roza Dam	185.6 to 127.9	57.7
Middle Yakima River	**127.9 to 47.1**	**80.8**
Yakima River from Roza Dam to Naches River	127.9 to 116.3	11.6
Yakima River from Naches River to Sunnyside Diversion Dam	116.3 to 103.8	12.5
Yakima River from Sunnyside Diversion Dam to Prosser Dam	103.8 to 47.1	56.7
Lower Yakima River	**47.1 to 0.0**	**47.1**
Yakima River from Prosser Dam to Columbia River	47.1 to 0.0	47.1

Source: Modified from Reclamation and Ecology, 2012
[1] Tributary of the Yakima River

3.2.1 Yakima Project Operations

As described in Section 1.4.2, Reclamation operates its five Yakima Project reservoirs in a coordinated manner to provide for the needs of the system as a whole. The releases from each reservoir are balanced to meet system-wide irrigation and water demands in conjunction with natural runoff and return flow available in the basin. Currently, no single reservoir is designated to supply the needs of one particular area, irrigation district, Yakima Project division, or the Treaty Trust obligation. The major storage facilities store runoff during the winter, spring, and summer seasons. This water is released during low-flow periods in the summer and fall seasons for irrigation.

Operational releases at Cle Elum Dam are affected by the presence of spring Chinook salmon redds in the Cle Elum River downstream from the dam (see Section 3.6.2 for additional information on salmonids). The presence of redds downstream results in conflicting needs for the operational releases from Keechelus, Kachess, and Cle Elum reservoirs. Reclamation makes an effort to reduce the impacts of Yakima Project operations on fishery resources and has developed reservoir release protocols to provide appropriate water flows to protect salmon redds, while managing water for irrigation.

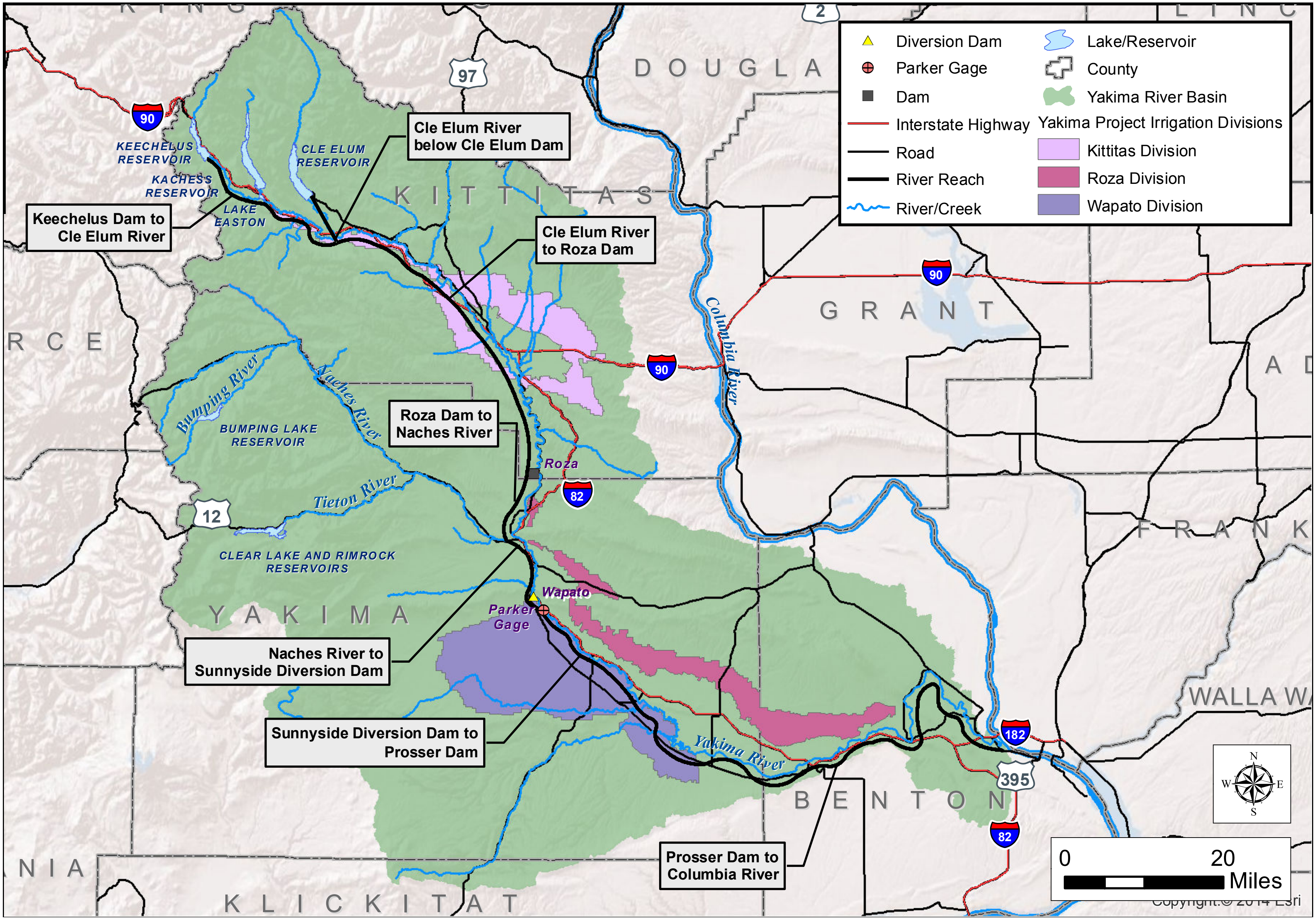

Figure 3-1. Yakima River Reaches

3.2.1.1 Cle Elum Dam and Reservoir Operations

Cle Elum Reservoir has a surface area of 4,868 acres and a total capacity of 436,900 acre-feet (427,930 acre-feet available for use) at its full pool elevation of 2,240 feet. The drainage area tributary to the reservoir is 203 square miles.

The prime flood control season extends from November through mid-June. From November 1 to January 31, Reclamation typically reserves 126,000 acre-feet of reservoir capacity for flood control on the Yakima River.

The mean annual runoff from the Cle Elum watershed is 672,000 acre-feet; annual runoff has varied from 366,000 acre-feet to 1,046,000 acre-feet. Cle Elum Reservoir regulates about 20 percent of the entire annual runoff above Parker Gage (average of 3,410,000 acre-feet), which is located downstream on the Yakima River near the City of Union Gap. Parker Gage is the primary control point for upper Yakima Project operations and is the point at which the target instream flows established by Section 1205 of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434), Title XII, Yakima River Basin Water Enhancement Project (108 Stat. 4550 USC) are set (referred to as Title XII target flows). Section 3.3.5.4 of the Integrated Plan PEIS (pp. 3-22 to 3-24) provides additional information on the Title XII target flows. The reservoir has the largest storage capacity in the Yakima River basin and is the main resource for meeting the large irrigation demands in the Yakima River basin above Parker Gage, including Roza Irrigation District, Sunnyside Division, and Wapato Irrigation Project (Figure 1-1).

Annually, the greatest volume of water released from Cle Elum Reservoir occurs in July and August to meet most of the lower Yakima River basin irrigation demands. Late-season irrigation demands (mid-September and October) are met primarily from Rimrock Reservoir in the Naches River basin (Figure 1-1). In late August and early September, Reclamation reduces the July and August releases (peak flow of about 3,400 cfs and median flow of 2,863 cfs) from Cle Elum Reservoir to a minimum flow range of 180 to 300 cfs to protect spawning areas in the upper Yakima River. To compensate for this reduced flow, Reclamation meets irrigation demands in the Yakima River system by increasing releases from Rimrock and Bumping reservoirs in the Naches River basin starting in late August or early September. The name of this operation is "flip-flop." The flip-flop operation allows Reclamation to meet a target flow of between 180 and 300 cfs in the Cle Elum River during winter for spring Chinook salmon incubation and early rearing.

Figure 3-2 is a hydrograph showing flows for the Cle Elum River below Cle Elum Reservoir for the period of October 1, 1997 to September 30, 2002. This series of years is representative of drought (2001), wet (1999), and normal (1998, 2000, 2002) runoff conditions.

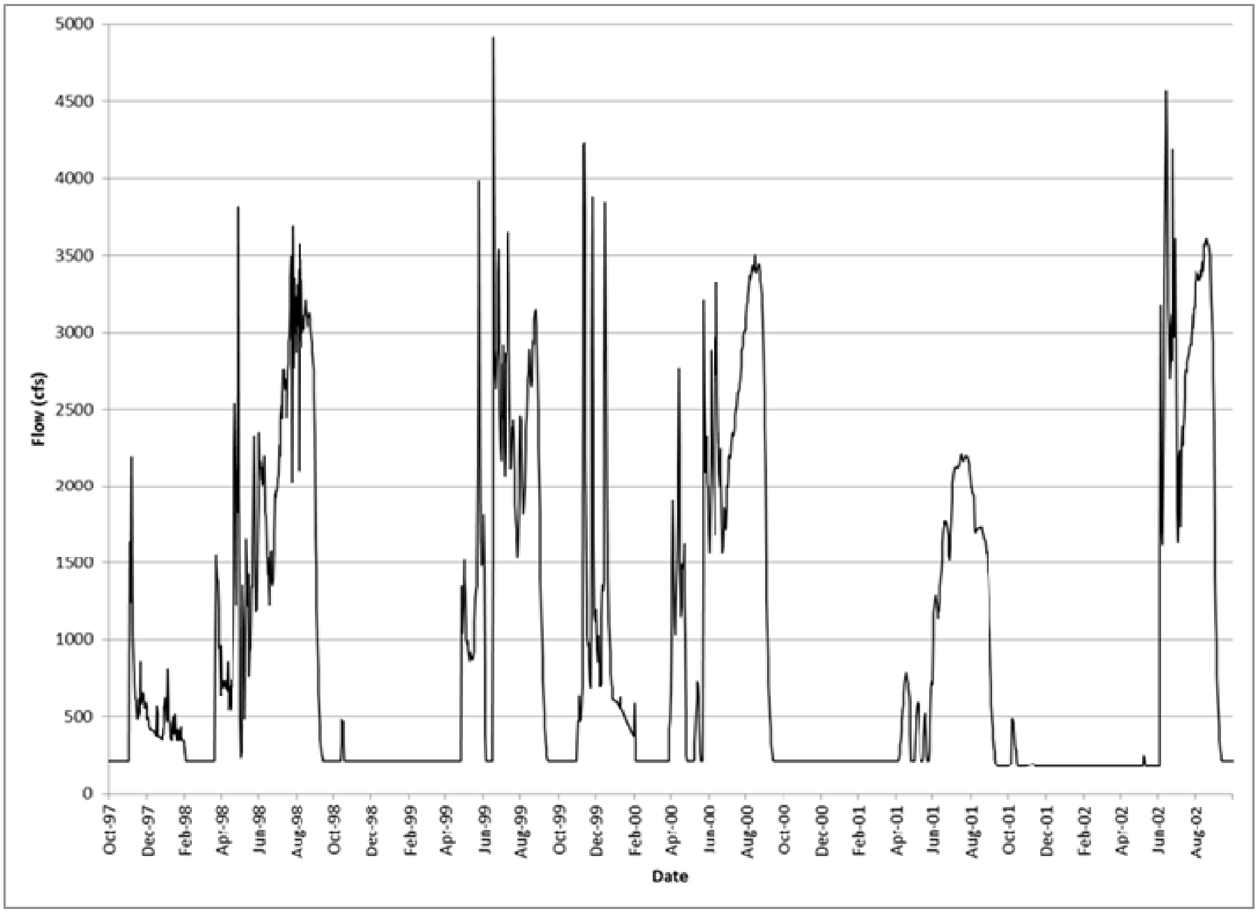

Figure 3-2. Representative Hydrograph for the Cle Elum River below Cle Elum Reservoir

As shown in Figure 3-2, the highest flows in the Cle Elum River occur during flood events in the winter and during spring when high snowmelt runoff flows into a full or nearly full reservoir. High, sustained flows occur during summer to meet peak irrigation demands along the Yakima River. The lowest flows occur from mid-September to about April when the reservoir is discharging water to provide minimum flows in the Cle Elum River while also filling. The minimum winter flow ranges from 180 to 300 cfs, depending on water supply conditions. The typical minimum reservoir release is 220 cfs. As part of normal operations, releases sometimes exceed established minimum flows. Table 3-2 provides a summary of average flows by month in the Cle Elum River downstream from Cle Elum Dam.

Table 3-2. Average Flow by Month in Cle Elum River downstream from Cle Elum Dam

Month	Average Flow (cfs)
January	311
February	224
March	342
April	608
May	885
June	1,846
July	2,600
August	2,812
September	461
October	232
November	287
December	359
Annual Average	922

3.2.2 Reservoir Levels

Cle Elum Reservoir typically reaches its lowest elevation in September when the irrigation season ends. In winter months, water is released to meet instream flows on the Cle Elum River and to maintain capacity for flood control. In the spring, water is stored in the reservoir to regulate downstream flows for flood control and to meet irrigation demands later in the year. The highest reservoir elevations generally occur in the May-to-July period, depending on the annual water supply. Full pool occurs at elevation 2,240. Figure 3-3 illustrates the baseline condition water level in Cle Elum Reservoir for the period of October 1, 1997, to September 30, 2002. The baseline condition is current conditions without the projects and actions that are part of the No Action Alternative described in Section 2.3.1. This series of years is representative of drought (2001), wet (1999), and normal (1998, 2000, 2002) runoff conditions. Reservoir pool levels fluctuated between approximately elevation 2,120 (20,000 acre-feet storage) and 2,240 (436,900 acre-feet storage) during this time (120-foot difference from low to full pool), with the lowest level occurring during the 2001 drought year. The outlet at the base of Cle Elum Dam has an invert elevation of 2,110.

During wet years, Cle Elum Reservoir remains at higher pool elevations during the late summer compared to average and drought years because of the high volume of runoff. The need to maintain flood control space of 126,000 acre-feet also creates the need to release more water the following winter.

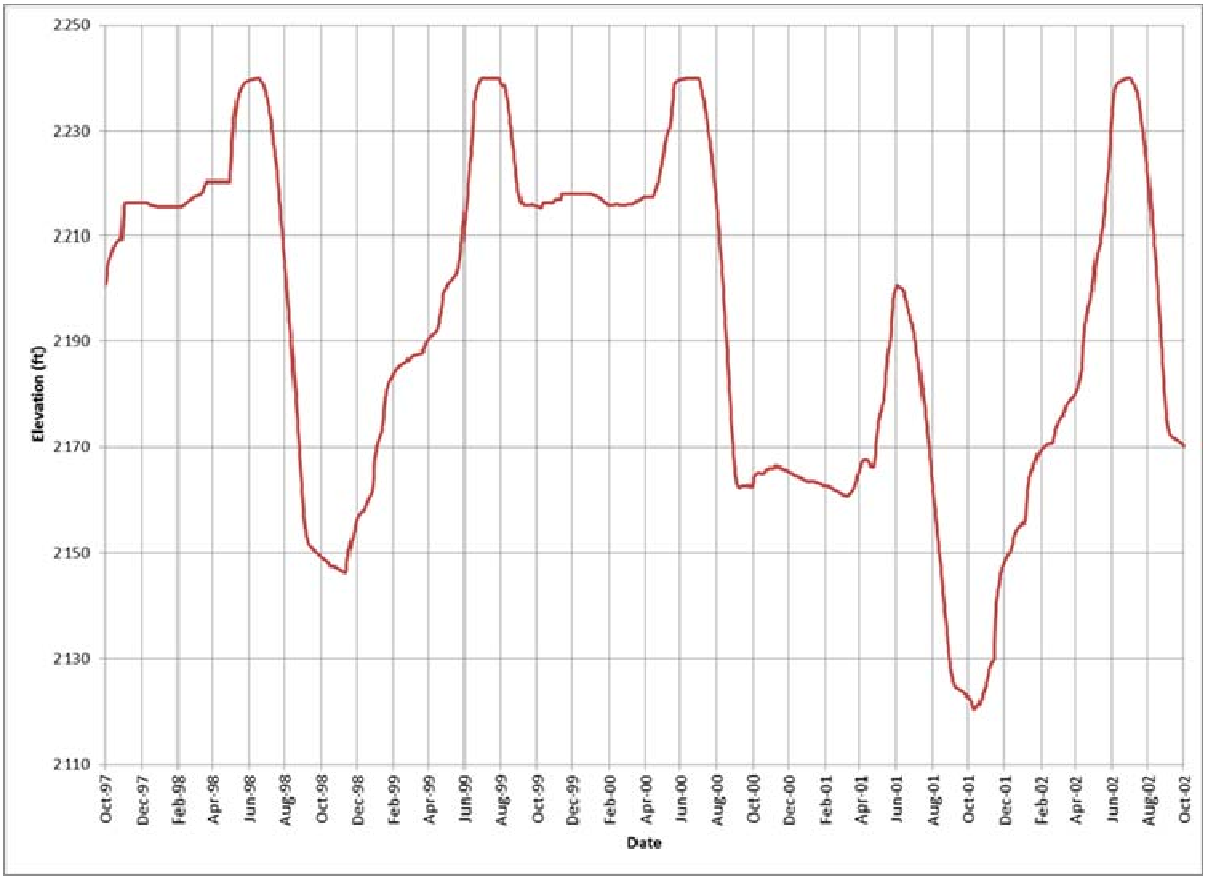

Figure 3-3. Cle Elum Reservoir Elevation Fluctuation

3.2.3 Upper Cle Elum River and Tributaries to Cle Elum Reservoir

The Cle Elum River headwaters are in the Alpine Lakes Wilderness Area near Mount Daniel. Major tributaries include the Cooper and Waptus rivers. No dams are located on the river or its tributaries upstream of the reservoir. Small tributaries flow into Cle Elum Reservoir from both the east and west. Information is not available about the flow conditions in the tributaries, but generally, flows from the tributaries provide minimal contributions to the reservoir. The largest tributary is French Cabin Creek, which enters the reservoir at its northwest end. Other tributaries include Spring, Bear, Davis, Newport, Bell, Morgan, and Dry creeks on the east side of the reservoir, and Branch and Para creeks on the west side of the reservoir. These tributaries contribute minor volumes of water to the reservoir, relative to the Cle Elum River.

3.2.4 Yakima River Downstream of Cle Elum River

The management of water supply in the Yakima River basin has changed the streamflow regime, with effects on anadromous and resident fish. The Cle Elum Pool Raise Project may change streamflow in the Yakima River from its confluence with the Cle Elum River to its mouth, a distance of 185.6 miles. A discussion of major flow-related issues that affect water resources, fisheries and water quality is presented in the following paragraphs by reach listed in Table 3-1.

3.2.4.1 Upper Yakima River - Yakima River from Cle Elum River to Roza Dam

Downstream from the confluence with the Cle Elum River, Yakima River flows are very high during the summer to provide water supply to water users in the middle Yakima River. The high flows are created by releases from Cle Elum Dam and upper Yakima River reservoirs (Kachess and Keechelus). Flows in the Yakima River from the Cle Elum River down to Roza Dam can exceed 4,500 cfs during summer. High summer flows and high water velocities reduce the amount of suitable rearing habitat for juvenile Chinook, steelhead, and coho salmon.

3.2.4.2 Middle Yakima River - Yakima River from Roza Dam to Naches River

In the reach of Yakima River between Roza Dam and Naches River, summer flows are lower than upstream because of diversions at Roza Dam. Flows in summer are typically in the range of 2,000 to 3,000 cfs. After the irrigation season, flows drop to a minimum flow of 400 cfs, except when augmented by natural flows from tributaries in the upper Yakima River reach or when the Roza Powerplant is shut down for maintenance. The low flows reduce quality and quantity of rearing habitat for spring Chinook, steelhead, and coho salmon. The low flows also impair migration of adult salmonids, mostly coho, migrating through this reach mid-September through mid-December on their way to spawning grounds in the upper Yakima River basin, but also spawn in this reach during the fall and early winter. Low spring flows also limit spring smolt outmigration. Figure 3-4 illustrates the baseline condition hydrograph for the Yakima River below Roza Dam for the period of October 1, 1997, to September 30, 2002.

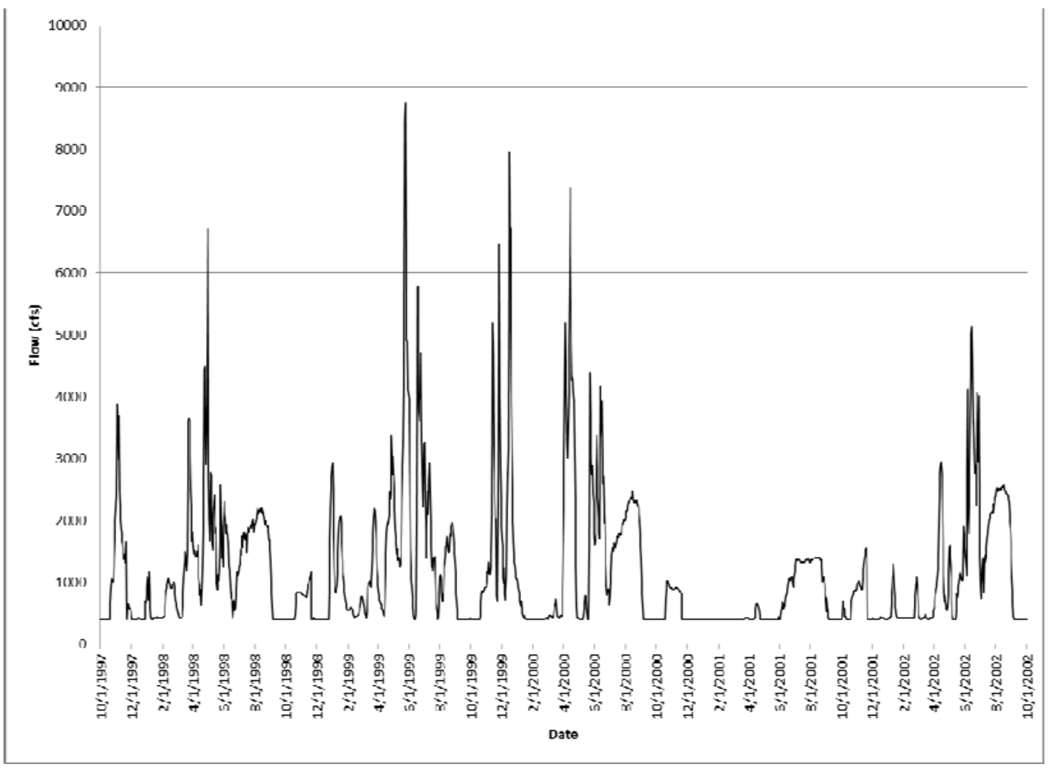

Figure 3-4. Representative Hydrograph for the Yakima River below Roza Dam

3.2.4.3 Middle Yakima River - Yakima River from Naches River to Sunnyside Diversion Dam

Flows in this reach of the Yakima River are higher than in the upstream reach because of Naches River flow contribution. Between the Naches River and the return from the Roza Powerplant, flows are low in winter and spring because of flow reductions for power generation at Roza Dam and flow regulation by Yakima Project reservoirs. Although the return from the Roza Powerplant enters this reach, flows are still lower than natural down to Sunnyside Diversion Dam. The low flows in this reach reduce quality and quantity of rearing habitat for spring Chinook, steelhead, and coho. Low spring flows limit spring smolt outmigration. Summer flows are higher than natural to supply irrigation entitlements down to Sunnyside Dam.

3.2.4.4 Middle Yakima River - Yakima River from Sunnyside Diversion Dam to Prosser Dam

In general, spring flows in the middle Yakima River from Sunnyside Diversion Dam to Prosser Dam are not sufficient to optimize survival of outmigrating smolts, especially in dry years when spring pulse flows are small. Summer flows downstream from Sunnyside Diversion Dam are less than ideal for salmonid habitat and proper riparian function. Summer Title XII target flows are described in Section 3.3.5.4, pp. 3-22 to 3-24 of the Integrated Plan PEIS (Reclamation and Ecology, 2012). The Title XII target flow ranges from 300 cfs to 600 cfs, depending on the estimate of TWSA. The target flows have increased over the Title XII flows by about 59 cfs as a result of conservation projects completed under YRBWEP (Reclamation and Ecology, 2012). Figure 3-5 is a hydrograph showing flows for the Yakima River below Sunnyside Diversion Dam for the period of October 1, 1997 to September 30, 2002. Yakima River flows increase in a downstream direction as return flow from irrigation and tributary flow accrete to the river.

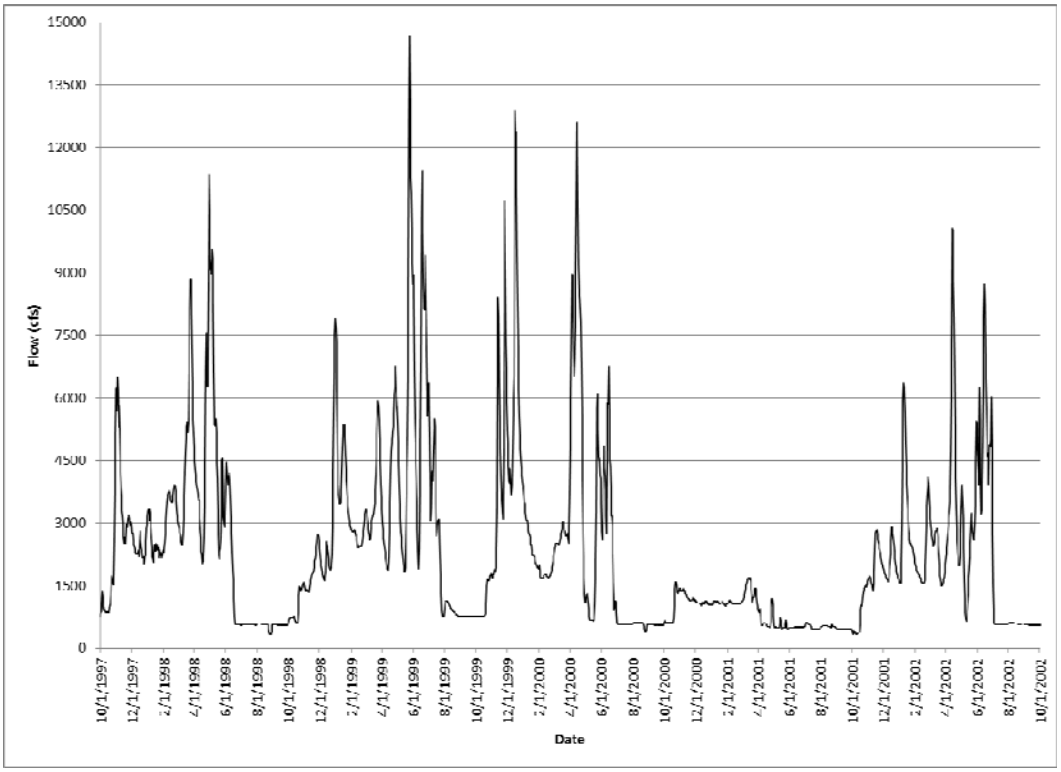

Figure 3-5. Representative Hydrograph for the Yakima River downstream from Sunnyside Diversion Dam

3.2.4.5 Lower Yakima River - Yakima River from Prosser Dam to Columbia River

At Prosser Dam, a diversion into the Chandler Canal exists for power generation and delivery to Kennewick Irrigation District, reducing flow over Prosser Dam. The Title XII target flows apply to flow over Prosser Dam. In the 11.3-mile reach between Prosser Dam and the return from Chandler Canal, Yakima River flows are low in summer. Figure 3-6 illustrates the baseline condition hydrographs for the Yakima River below Prosser Dam for the period of October 1, 1997, to September 30, 2002. Downstream from the Chandler Canal return, flows are higher but still lower than natural. Throughout the entire reach, spring flows are lower than optimal for smolt outmigration, especially during dry years. A big issue in this reach is temperature. Temperatures increase in the summer to a point limiting the use of the river by salmon. Juvenile rearing and adult migration are adversely affected. Section 3.4, Water Quality, provides additional information on Yakima River temperatures in this reach.

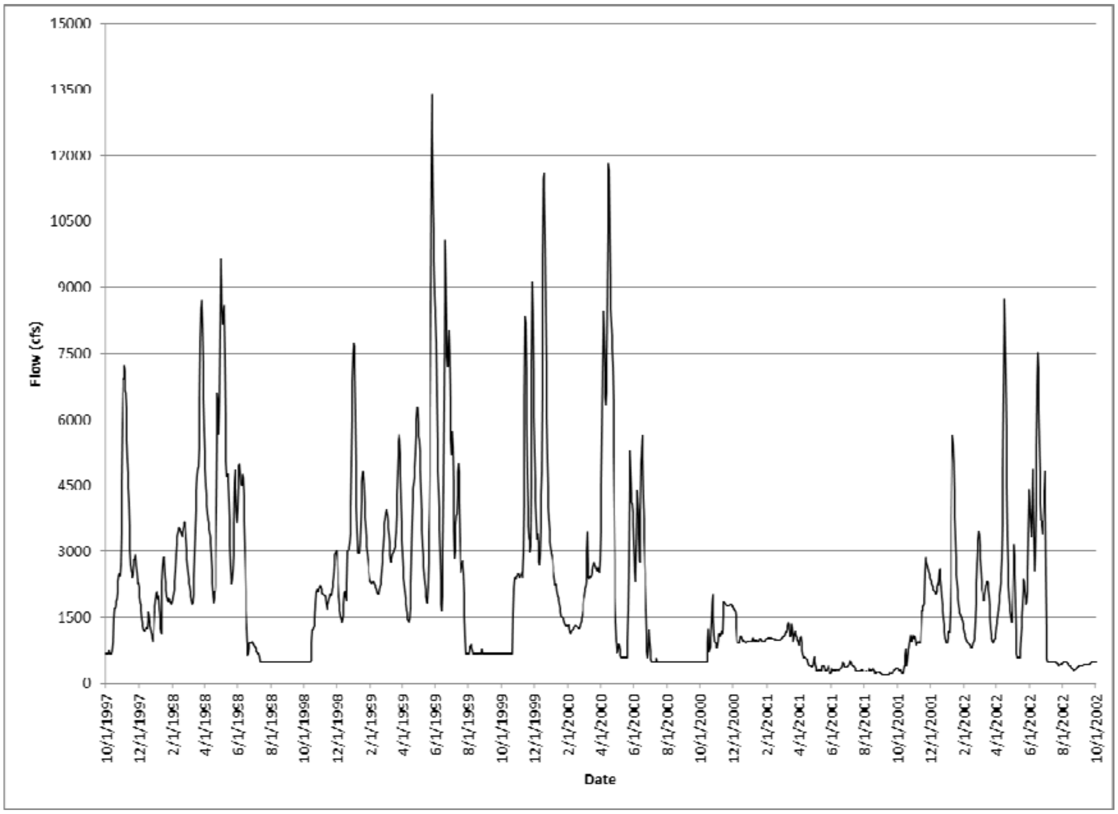

Figure 3-6. Representative Hydrograph for the Yakima River downstream from Prosser Dam

3.3 Earth Resources

"Earth Resources" refers to geology and soils. For the purposes of this EIS, the focus of the Earth Resources section is on the potential for erosion at the reservoir. The area of impact analysis is the shoreline of Cle Elum Reservoir and the banks of the Cle Elum River downstream from the reservoir.

Cle Elum Reservoir is located in the northwest portion of the Yakima River basin, in an area dominated by Mesozoic (252 to 66 million years ago) metamorphic rocks and Tertiary (65 to 1.8 million years ago) volcanic and sedimentary deposits. In the valley floor, basin-fill deposits consist predominantly of alluvial, lacustrine, and glacial deposits.

Cle Elum Reservoir is located in a U-shaped valley formed by multiple glacier advances during the Pleistocene period (2.5 million to 11,700 years ago). A moraine (accumulation of unconsolidated glacial debris) deposited by the last glacial advance blocked the valley and formed a natural dam, impounding a glacial lake. The river subsequently breached the moraine, and incised a deep channel through the moraine and outwash deposits, forming the outlet of the glacial lake. An earthfill dam constructed by Reclamation blocks the deep channel that had worn through the moraine materials (Kinnison and Sceva, 1963). The glacial materials near the dam range in size from rock flour to boulders. Geologists have not reached bedrock during investigations at the dam (Reclamation, 2014a).

Reclamation performed a reconnaissance of the west shoreline of Cle Elum Reservoir (Reclamation, 2014c) to establish a baseline of shoreline conditions, determine the extent of areas susceptible to erosion on the west shoreline, and make recommendations on whether to stabilize the shoreline as part of the Cle Elum Pool Raise Project. The reconnaissance determined that the west shoreline of Cle Elum Reservoir is predominantly sedimentary and volcanic bedrock with a thin soil covering. Exceptions occur in areas in the southwest corner of the reservoir; these areas are composed of glacial drift and colluvium (loose sediment deposited at the base of hillslopes), with intermittent exposures of alluvium (loose sediment eroded by streams) at the mouths of tributary streams along the middle section of the west shoreline.

Reclamation observed three general types of shoreline:

- About 6,000 feet (12 percent) of eroding gravelly bluffs 10 to 15 feet high, partially stabilized by vegetation, driftwood, or both. These areas are primarily in the southwest corner of the reservoir. Discontinuous sections of this type of shoreline are also located in the middle third of the west shoreline. This type of shoreline has moderate potential for future erosion due to the pool raise.
- About 2,300 feet (5 percent) of eroding near-vertical soft sandstone banks. This type of shoreline is located just north of the first type of shoreline. This type of shoreline has moderate potential for future erosion due to the pool raise.
- About 39,600 feet (83 percent) of stable and heavily vegetated shoreline. In these areas, exposed rock is typical at the waterline with established vegetation above. This type of shoreline is located primarily in the northern two-thirds of the west shoreline. It has low potential for future erosion due to the pool raise.

Photos 3-13 to 3-15 show the three types of shoreline.

Photo 3-13. Shoreline on East Side of Reservoir Showing Eroding Gravelly Banks

Photo 3-14. Shoreline on West Side of Reservoir Showing Near-vertical Soft Sandstone Bank

Photo 3-15. Shoreline on West Side of Reservoir Showing Rock and Heavily Vegetated Bank

Geologic conditions of shorelines on the east side of the reservoir are similar to those of the west side, but more exposed to wind waves and more susceptible to erosion. The southeast part of the shoreline (from the dam to about Wish Poosh Campground) consists of glacial drift, with moderate to high potential for erosion at higher reservoir levels. Farther north along the shoreline are pockets of alluvium and colluvium with moderate to high potential for erosion. Reclamation and property owners have placed rock riprap at the toe of several slopes at the southeast end of the reservoir. Some of the riprap is effective at reducing or stopping wave erosion. However, the slopes are still steep and susceptible to further erosion from weathering. Photos 3-16 and 3-17 show shoreline areas on the southeast side of the reservoir.

There are two mass wasting deposits mapped around the reservoir. One is located along the southwest shoreline and one is located on the east shoreline near Wish Poosh Campground. There is no evidence of recent landslides.

Photo 3-16. Shoreline on Southeast Side of the Reservoir Not Protected by Rock Riprap

Photo 3-17. Shoreline on Southeast Side of the Reservoir Currently Protected by Rock Riprap

3.4 Surface Water Quality

This section describes the water quality of Cle Elum Reservoir, the Cle Elum River upstream and downstream of the reservoir, and the Yakima River downstream of its confluence with the Cle Elum River. These represent the water bodies potentially affected by the project. Section 3.5 describes groundwater quality.

3.4.1 Regulatory Setting

3.4.1.1 Clean Water Act

The Clean Water Act (CWA) of 1972 aims to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA also establishes the basic structure for regulating pollutant discharges to regulated waterways.

Ecology has established water quality standards to protect public health and welfare, to protect the quality of surface water in Washington, and to meet the requirements of the CWA. Section 303(d) of the CWA requires Washington to develop a list of water bodies that do not meet State water quality standards. When water quality fails to meet State water quality standards, Ecology identifies the sources of pollutants and sets the maximum amount of pollutants that each source can discharge to a water body; these maximum amounts are known as total maximum daily loads (TMDLs).

3.4.1.2 State Water Quality Assessment and 303(d) List

Section 303(d) of the CWA requires all states to prepare a water quality assessment and develop a list of impaired surface waters (marine and freshwater). In Washington State, Ecology periodically prepares this list and submits it to EPA for review and approval. At present, the 303(d) lists are on a 2-year alternating cycle (i.e., fresh water one year and marine water the next year). Ecology is in the process of updating the freshwater listing with approval by the EPA expected in winter 2014-2015 (Ecology, 2014d). The Section 303(d) list identifies five categories of water quality impairment:

- Category 1 – meets tested standards for clean waters
- Category 2 – waters of concern
- Category 3 – insufficient data
- Category 4 – polluted waters that do not require a TMDL limit of targeted pollutant(s) to enable achieving the surface water quality standards; three subcategories of Category 4 have been established:
    - Category 4a – has a TMDL
    - Category 4b – has a pollution control program
    - Category 4c – is impaired by a nonpollutant
- Category 5 – Polluted waters that require a TMDL

The Cle Elum Reservoir is not listed on the State's 303(d) list for any water quality impairments. The Cle Elum River is listed as Category 5 (Polluted Water) for water temperature at the following two locations: the inflow to the reservoir and the reservoir outflow. The State's 303(d) list includes the river as Category 2 (Waters of Concern) for temperature farther downstream and upstream at the outlet, and for pH downstream of Hyas Lake (near the headwaters of the river).

3.4.1.3 Total Maximum Daily Load

The CWA requires States to establish TMDL programs for parameters not meeting applicable surface water quality standards as identified on Section 303(d) water quality impaired lists. A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet the water quality standards. A TMDL also identifies the sum of the allowable loads of a single pollutant from all point and nonpoint sources and determines a margin of safety to ensure protection of the waterbody in case there are unknown pollutant sources or unforeseen events that may impair water quality.

Ecology has established TMDLs for the upper Yakima River for dieldrin, DDT, suspended sediment, and turbidity. No TMDLs are currently in place for the Cle Elum Reservoir or Cle Elum River. However, a TMDL for temperature in the upper Yakima River basin is under development. The mainstem Yakima River, lower Kachess River, and lower Cle Elum River are not included in this TMDL because Ecology will address them in later studies (Ecology, 2014d). This TMDL will target potential system shade levels as an approach to address peak water temperatures. This TMDL will include both 303(d)-listed and non-303 (d)-listed waters. Ecology is also in the process of updating the lower Yakima River suspended sediment TMDL that includes DDT to include targets for human health (Ecology, 2012). Ecology expects to issue a draft of the updated Lower Yakima River TMDL in 2015.

3.4.1.4 Washington State Antidegradation Policy

The CWA requires that State water quality standards protect existing uses by establishing the maximum level of pollutants allowed in State waters. The standards must also protect those waters whose existing water quality is higher than the standards. The antidegradation process helps prevent lowering of water quality, and provides a framework to identify water designated as an "outstanding resource" by the State of Washington. The State's antidegradation policy (WAC 173-201A) follows Federal regulation guidelines, and has three tiers of protection, with Tier III providing the highest level of protection:

- Tier I - Used to ensure existing and designated uses are maintained and protected. Tier I applies to all waters and all sources of pollution.
- Tier II - Used to ensure that waters of a higher quality are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities.
- Tier III - Used to prevent the degradation of waters formally listed as "outstanding resource waters." Tier III applies to all sources of pollution.

All three tiers have provisions that protect and maintain existing and designated uses and do not allow water quality degradation. If waters are not consistent with water quality standards, a permit applicant must correct problems to ensure meeting water quality criteria. If water quality is higher than the criteria, the applicant must take steps to ensure that there is no measureable degradation of water quality. If an action results in a measureable lowering of water quality, the applicant must conduct an analysis to determine whether it is in the overriding interest of the public.

3.4.2 Water Quality Use Designations in the Project Area

The Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A) state that the Cle Elum River and Cle Elum Reservoir are protected for the following Use Designations under WAC 173-201A: core summer salmonid habitat, extraordinary primary contact recreation, domestic water, industrial water, agricultural water, stock water, wildlife habitat, harvesting commerce/navigation, boating, and aesthetics.

Table 3-3 lists the State's water quality standards for required conditions to meet the core summer salmonid habitat aquatic life use designation.

Table 3-3. Conditions Required to Meet Core Summer Salmonid Habitat Aquatic Life Use

Pollutant	Conditions to be Met
Temperature	• Not to exceed 16°C (60.8°F) due to human activities. • When natural conditions exceed 16°C, the State allows no temperature increases that would raise water temperature by more than 0.3°C (32.5°F).
Dissolved oxygen	• Not to drop below 9.5 milligrams per liter (mg/L). • When natural conditions lower the dissolved oxygen (DO) below 9.5 mg/L or within 0.2 mg/L of the criteria, human actions considered cumulatively may not cause DO to decrease more than 0.2 mg/L.
Turbidity	• Not to exceed 5 nephelometric turbidity units (NTU) over background when the background is 50 NTU or less; or a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total dissolved gas	• Not to exceed 110 percent of saturation at any point of sample collection. • Ecology may adjust the total dissolved gas criteria to aid fish passage over hydroelectric dams when consistent with an Ecology-approved gas abatement plan.
pH	• Not to vary from the range of 6.5 to 8.5 on the pH scale, with a human-caused variation within the above range of less than 0.2 units.

The extraordinary primary contact recreation use requires meeting the following condition for bacteria: fecal coliform organism levels must not exceed a geometric mean value of

50 colonies per 100 mL, with not more than 10 percent of all samples (or any single sample when less than 10 sample points exist) obtained for calculating the geometric mean value exceeding 100 colonies per 100 mL.

The use designations also require that toxic, radioactive, or deleterious material concentrations must be below those that have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions in the most sensitive biota dependent upon that water, or adversely affect public health. The presence of materials or their effects, excluding those of natural origin, must not impair aesthetic values, which offend the senses of sight, smell, touch, or taste.

3.4.3 Reservoir Water Quality

Ecology performed water quality surveys in the Cle Elum Reservoir in 1989 and 1990. The results showed that Cle Elum Reservoir is oligotrophic (nutrient-poor and oxygen-rich), but experiences high phosphorus from June to September. Dissolved oxygen levels in June and September were supersaturated and oxygen distribution in the fall was largely a function of temperature (Ecology, 1990). Ecology commented that the phosphorus concentration in September was troublesome, possibly indicating that the seasonal reservoir drawdown may be exposing sediments that become entrained in the water column (Ecology, 1991).

Reclamation collected water quality data in the reservoir (100 meters (328 feet) upstream of the dam) during June, July, and August at various depths throughout the water column. Based on data retrieved from STORET (the EPA database for water quality data) on August 21, 2014, these data were mostly collected from 2002 to 2012 with one data collection event in June 1999. These sampling results indicate water quality in the reservoir is moderate to good. During sampling from a depth of 1 meter, reservoir waters were clear (average Secchi disk depth of 6.7 meters) with low average turbidity, low total suspended solids, low average fecal coliform counts, and an average pH of 7.4. Summer peak water temperatures above the State surface water quality standard of 16°C (60.8°F) (WAC 173-201A) were reported at depths of 1, 3, 5, and 7 meters (3.2, 9.8, 16.4, and 22.9 feet). Reclamation recorded a peak water temperature of 20°C (68°F) in August 2012 at a depth of 1 meter. Water temperatures decreased with depth, indicating the presence of a summer thermocline within the reservoir. Dissolved oxygen concentrations increased with depth; the average was 9.4 mg/L at 1 meter depth and over 11 mg/L at 45 meters depth (based on two measurements). Dissolved oxygen concentrations were higher than the State surface water quality minimum standards (greater than 9.5 mg/L) at depths up to 19 meters (62.3 feet).

Orthophosphate concentrations were low, with most readings at or below detection (0.003 mg/L). Total phosphorus concentrations ranged from below detection (less than 0.01 mg/L) to 0.016 mg/L, which are concentrations below oligotrophic lake classification for the Columbia Basin Ecoregion in the State surface water quality standards (WAC 173-201A).

Reclamation conducted a limnological study of Cle Elum Reservoir between September 2003 and October 2005. The objectives of the study were to improve the understanding of the physical, chemical, and biological conditions in the reservoir; to assess primary and secondary production; to determine if the present conditions would support introduced anadromous salmonids; and ultimately to determine the extent to which anadromous fish could be restored in the basin (Lieberman and Grabowski, 2007). Although the study was conducted 10 years ago, the results are still considered relevant because there have been few changes in the reservoir or its headwater areas. The study showed that water columns in Cle Elum Reservoir stratify twice each year (dimictic), with turnover occurring in or around April and October. Strong stratification occurs from July through September. The outlet works (elevation 2,110) for Cle Elum Dam drafts water from well below the full pool elevation of 2,240 feet; therefore, water releases come from cooler levels of the reservoir. The maximum temperatures occurred in July, exceeding 16°C (60.8°F) at a depth of about 50 feet (Lieberman and Grabowski, 2007). Surface temperatures in the reservoir ranged from 6.3 to 21.2°C (43.3 to 70.2°F) between September 2003 and October 2004, and from 5.2 to 18.4°C (41.4 to 65.1°F) from October 2004 to October 2005 (Lieberman and Grabowski, 2007). To date, no water quality models have been developed for the reservoir.

The Cle Elum Reservoir is well oxygenated (i.e., close to saturation) with some variation caused by seasonal stratification (Lieberman and Grabowski, 2007). During 2003 to 2005, DO levels remained above 9.0 mg/l throughout most depths with some lower values observed near the surface and bottom of the reservoir during summer and fall stratification (Lieberman and Grabowski, 2007). The minimum DO measured at the bottom of Cle Elum Reservoir (6.5 mg/L) occurred in September 2004 (Lieberman and Grabowski, 2007).

Cle Elum Reservoir's major limiting factors for anadromous fish production are low concentrations of nutrients, chlorophyll *a*, phytoplankton, zooplankton, and total organic carbon (TOC). Before the dam was constructed, returning salmon spawning and dying likely contributed marine-derived nutrients to historic Cle Elum Lake (Cederholm et al., 2011). Since the dam blocked fish passage, input of those nutrients has been lacking, likely contributing to the unproductive nature of the reservoir. Recently, the Yakama Nation has been introducing sockeye and Chinook salmon above Cle Elum Dam, which may increase marine-derived nutrients into the Cle Elum River and reservoir as those runs become established.

3.4.4 Cle Elum River Water Quality

Cle Elum River is 303(d)-listed for water temperatures that are higher than the standard acceptable levels for fish immediately upstream of and immediately downstream from the reservoir (Ecology, 2014d). The 303(d) temperature listings are based on numerous samples that were higher than the applicable maximum water temperature criterion as determined by the USFS in sampling efforts in 1993, 2000, 2001, and 2002 (Ecology, 2014d). The current 303(d) listings were carried over from the 303(d) list of 2004. Ecology has not yet developed a TMDL for the temperature listings.

3.4.4.1 Upstream of the Reservoir

Much of the upper Cle Elum watershed lies within the Alpine Lakes Wilderness Area and, therefore, is not affected by forest practices. Both Thorp Creek and the Cooper River, tributaries to the upper Cle Elum River are listed on the 303(d) list for temperature. The

2003-2005 limnological study (Lieberman and Grabowski, 2007) measured temperature at the reservoir inflow and outflow in addition to water quality within the reservoir. Inflow temperatures ranged from 5.2 to 18.3°C (41.4 to 64.9°F) in the 2004 sampling period and from 7.1 to 17.9°C (44.8 to 64.2°F) in the 2005 sampling period. Minimum and maximum temperatures at the inflow to Cle Elum Reservoir in 2004 were cooler than those at the reservoir surface in the 2004 study year, but within the range measured at the surface in 2005.

In 2006, the U.S. Geological Survey (USGS) collected temperature data in Cle Elum River above Cle Elum Reservoir. In June, the minimum temperature was 4.7°C (40.5°F), the maximum was 13.3°C (55.9°F), and mean was 7.8°C (46.0°F) (USGS 2010). In August of the same year, the minimum temperature was 10.1°C (50.2°F), the maximum was 20.0°C (68.0°F), and mean was 14.9°C (58.8°F) (USGS, 2010).

3.4.4.2 Downstream from the Reservoir

Reclamation also measured outflow temperature from Cle Elum Reservoir in the 2003-2005 limnological study (Lieberman and Grabowski, 2007). Outflow temperatures ranged from 7.8 to 19.5°C (46.0 to 67.1°F) in the 2004 sampling period and from 6.0 to 16.4°C (42.8 to 61.5°F) in the 2005 sampling period (Lieberman and Grabowski, 2007). At the outflow in the 2004 study year, the minimum temperature was warmer and the maximum within the range of those measured at the reservoir. In the subsequent study year, outflow minimum and maximum temperatures fell within the range of the reservoir's surface temperature.

Reclamation collected water quality data in the Cle Elum River downstream from the dam during June, July, and August. Based on data retrieved from STORET on August 21, 2014, these data were mostly collected from 2002 to 2012, with one data collection in June 1999. These sampling results indicate water quality in the river is good to excellent. During sampling the river was cool and well oxygenated, with low turbidity, low total suspended solids concentrations, and low fecal coliform counts. The average pH was 7.35. Water temperatures exceeding the state surface water quality standard of 16°C (60.8°F) (WAC 173-201A) were not reported. During sampling, the average water temperature was 10.7°C (51.3°F). No violations of the state surface water quality standard for DO (greater than 9.5 mg/L) were reported. The average during sampling was 11.2 mg/L. Orthophosphate concentrations were low, with concentrations reported at or below detection (0.003 mg/L). Total phosphorus concentrations were all below detection (less than 0.01 mg/L) with the exception of one concentration of 0.018 mg/L measured in August 2012.

Ecology collected monthly water quality data in water year 2010 at a now inactive monitoring station on the Cle Elum River near the town of Rosyln. Based on the water year 2010 summary, Ecology concluded overall water quality at this station met or exceeded expectations and is of lowest concern (Ecology, 2014d). Temperature was the lowest rated parameter with a moderate water quality index rating. However, the monthly peak water temperature of 14.7°C (58.5°F) recorded in August 2010 met the State water quality standard of 16.0°C (60.8°F) (WAC 173-201A). DO concentrations ranged from 9.6 mg/L to 13.73 mg/L. In addition, turbidity, fecal coliform bacteria, and pH met the applicable State water quality standards (WAC 173-201A). Ecology noted in the 2002 TMDL report for the upper Yakima River that the Cle Elum River downstream from the reservoir is a large source of water but a low source of suspended sediment (Ecology, 2002).

The source of flow for the Cle Elum River below the dam is the outlet works located at elevation 2,110. However, during spring, Reclamation may release water from the spillway gates (reservoir surface) into the Cle Elum River. Because this release is limited to the spring (before the reservoir summer thermocline is established), any detrimental impacts from increased temperature or low DO from a surface layer inflow are minimal. Peak surface water temperatures and lower DO concentrations in the reservoir occur during July and August, when releases from the spillway do not occur. Reclamation also measured partial pressure of dissolved gas in the Cle Elum River below the dam. Two measurements in July 2011 and July 2012 just exceeded the 110 percent criterion at 110.8 percent and 110.3 percent respectively.

3.4.5 Yakima River Water Quality

In the vicinity of the town of Cle Elum, the Yakima River has moderate to good water quality. The Yakima River downstream of the confluence with the Cle Elum River is classified as salmonid spawning, rearing and migration per the state water quality standards (Chapter 173-201A WAC). The river is listed on Ecology's 303(d) water quality list as Category 5 (polluted) for temperature, pH, and dissolved oxygen (see discussion below) (Ecology, 2014d). A TMDL is already in place for dieldrin, DDT, suspended sediment, and turbidity.

3.4.5.1 Ecology Ambient Water Quality Monitoring Data (Station 39A090 and Station 39A055)

Ecology maintains two water quality monitoring stations in the upper Yakima River Basin. Station 39A090 is located near Cle Elum with continuous sampling since September 1994 (water year 1995) and Station 39A055 is located down river near the confluence with Umtanum Creek with continuous monthly sampling since September 2009 (water year 2010). Based on water quality data collected at both stations, Ecology rates the overall Yakima River water quality as meeting or exceeding expectations and is of lowest concern, based on water year 2014 data summary (Ecology, 2015). At station 39A090, water quality sampling results indicate state standards for dissolved oxygen (>9.5 mg/L) and water temperature (16 C) were not met during numerous sampling events. At station 39A055, water quality sampling results indicate state standards for pH and water temperatures were not met during numerous sampling events, and one fecal coliform sample collected in 2013 exceeded the state criterion of 100 CFU/100 mls.

3.4.5.2 Ecology 303(d) Water Quality Listing

The Yakima River downstream of the project area is listed for various contaminants in fish tissue, as well as temperature (Category 5), pH (Category 5), dissolved oxygen (Category 5), dieldrin (Category 2), ammonia-N (Category 2), and bacteria (Category 2).

3.4.5.3 Total Maximum Daily Load

Ecology has an EPA-approved TMDL in the upper Yakima River for dieldrin, DDT, suspended sediment, and turbidity. As of 2006 and 2007, monitoring results showed that the TMDL implementation had resulted in water quality improvement (Ecology, 2014f).

Scheduled for completion in 2016, the TMDL sets water column targets for pesticides and turbidity. Pesticide targets were set for Cherry Creek and Wipple Wasteway, both of which are located downstream near Ellensburg. Turbidity targets were set for tributaries (90th percentile not to exceed 5 NTU) and mainstem (90th percentile at RM 139.8 and RM 121.7 not to exceed 5 NTU above 90th percentile at RM 191). In 2006, Ecology and partner organizations found that most of the interim turbidity targets were met; in 2011, they found that many but not all of the final TMDL targets for turbidity were being met.

3.4.5.4 Ecology Chlorinated Pesticides, PCBs, and Dioxins in Fish Tissue

Ecology's 2006 study that analyzed chlorinated pesticides, polychlorinated bipenyls (PCBs) and polychlorinated dioxins and furans (PCDDs and PCDFs) in the Yakima River including sampling at five sites along the Yakima River: Cle Elum, Yakima Canyon, Wapato, Prosser, and Horn Rapids (Ecology, 2007). Sampling results show DDE and dieldrin exceeded human health criteria in one or more species at all the sites except Cle Elum. Total PCBs exceeded the human health criteria in at least one species at all sampling sites. Total chlordane also exceeded the human health criterion in carp at Prosser.

3.4.5.5 USGS Modeling Water Temperature in the Yakima River, Washington from Roza Diversion Dam to Prosser Dam, 2005-06

A mechanistic model was created by the USGS for the Bureau of Reclamation to study the potential effects of management options on maximum water temperatures in the Yakima River between Roza and Prosser, Washington (USGS, 2008). The purpose of the model was to simulate maximum daily water temperatures for any given year between April 1 and October 31. The model was calibrated with data collected in 2005 at five sites along the study reach between Roza and Prosser and tested with data collected in 2006. The mean error ranged between -1.3 and 1.6 C. As part of the model parameter sensitivity analysis, it was found that daily maximum water temperature was most sensitive to changes in air temperature and solar radiation indicating these parameters have the greatest influence on water temperatures in the lower Yakima River. That means that varying the temperature of water released from Yakima Project reservoirs (including Cle Elum Reservoir) during summer would not strongly influence water temperatures in the lower Yakima River.

3.4.5.6 US Bureau of Reclamation Hydromet Water Temperature Data

Reclamation monitors water temperatures at numerous locations in the Yakima River. Based on daily average water temperature data collected at five sites located downstream of the confluence of the Cle Elum River (Stations are listed upstream to downstream: Horlick, Roza [below the dam], Parker, Prosser and Kiona) daily mean water temperatures show a general trend in increasing water temperatures down river with peak mean water temperatures recorded at the most downstream location at Kiona near the confluence with the Columbia River (Reclamation 2015b). As shown in Figure 3-7, the lower Yakima River temperatures are too warm in July to September and restrict migration of salmon upstream (Section 3.6.2).

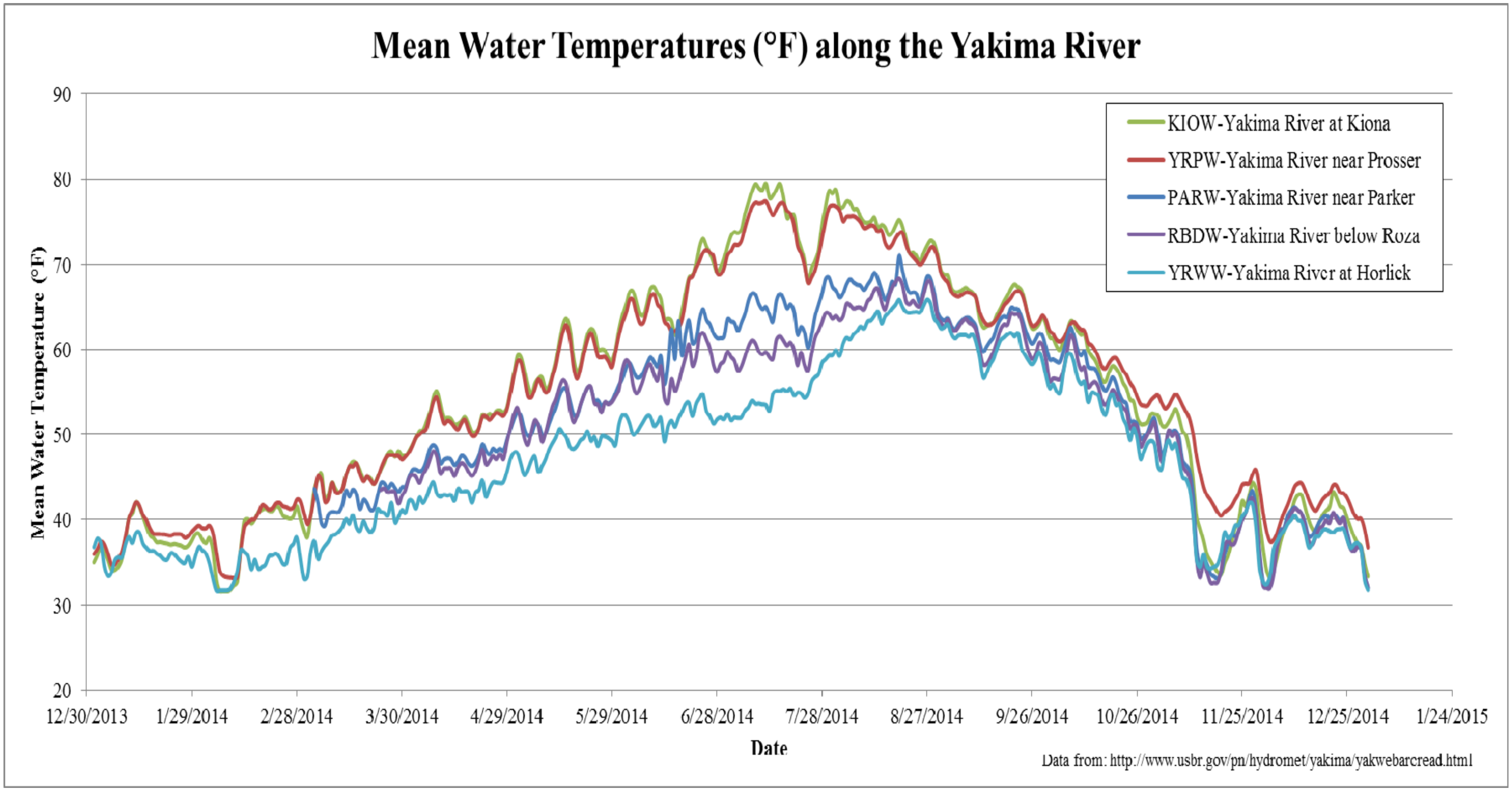

Figure 3-7. Yakima River Mean Daily Water Temperatures from January through December 2014

3.5 Groundwater

The area of analysis for groundwater impacts is the area immediately around the reservoir where the higher reservoir pool could affect groundwater elevations. The impact analysis area includes the drinking water wells and onsite septic systems (OSS) near the reservoir where changing reservoir and groundwater levels could be affected.

The primary groundwater resources in the Cle Elum Reservoir area are unconsolidated Quaternary-age aquifers, comprised of glacial outwash and alluvium, and bedrock aquifers. The Ecology online well database for drilling logs describes the geology around the reservoir. Water wells around the reservoir target a variety of water-bearing geologic formations, including (from youngest to oldest) the following:

- Quaternary-age glacial outwash
- Tertiary-age sandstone and basalt
- Cretaceous- to-Jurassic-age schist and phyllite

Some of the wells near the reservoir are located in unconsolidated glacial outwash, which can reach over 200 feet thick according to well logs. Static water levels in these wells are generally 50 to 150 feet below ground surface (bgs). Wells less than 100 feet deep can have static water levels as shallow as 10 to 20 feet bgs. The glacial outwash is likely an unconfined aquifer, in which case static water levels represent the water table, but could also contain perched groundwater based on the clay content indicated on some well logs. The relatively high permeability of the glacial outwash provides a potential hydraulic connection with the Cle Elum Reservoir, and wells installed in the glacial outwash could have water levels that fluctuate with the reservoir pool elevation. Many wells installed near the reservoir are in bedrock formations, with static water levels generally 50 to 100 feet bgs. The Tertiary-age Roslyn Formation contains sandstone members commonly targeted for domestic wells. Static water levels that are higher than the top of the respective formations are evidence of confined groundwater in the bedrock near the reservoir. Wells installed in confined bedrock aquifers are unlikely to respond to changes in the pool elevation of Cle Elum Reservoir because of poor hydraulic connection between deep formations and the reservoir. Downstream from Cle Elum Dam, wells that target the alluvium and glacial outwash have static water levels that range from 10 to over 100 feet bgs, depending on proximity to Cle Elum River.

The State implemented groundwater management efforts to assess the availability and sustainability of groundwater in upper Kittitas County, including the Cle Elum Reservoir area. New groundwater withdrawals in the Cle Elum Reservoir area are subject to the upper Kittitas Ground Water Rule (WAC 173-539A), effective January 22, 2011. Under this rule, Ecology prohibits new groundwater withdrawals in upper Kittitas County unless Ecology has determined that the use is “water budget neutral.” "Water budget neutral" means that water withdrawals with impact on streams must be offset by retaining an equivalent amount of existing water rights instream, generally through water rights purchases. Ecology deemed this degree of groundwater management necessary until there is sufficient information about the potential effects of groundwater withdrawals on senior surface water rights and streamflow in the Yakima River basin. As a result, the USGS and Ecology began analyzing groundwater-surface water interactions in November 2010, and documented their findings in July 2014 (Gendaszek et al., 2014). Ecology expects this report to inform future groundwater management in the Yakima basin.

There are no groundwater quality problems known to exist in the Cle Elum Reservoir area. Groundwater quality in the area is suitable for domestic consumption. A search of Ecology's Toxics Cleanup Program database included lists of leaking underground storage tanks, confirmed and suspected contaminated sites, sites requiring no further action, and regulated underground storage tanks at active facilities (Ecology, 2014c). None of the sites listed in the Toxics Cleanup Program databases are located on a parcel that the Cle Elum Pool Raise Project would inundate. The nearest listed site is a no further action site located near the intersection of Salmon La Sac Road and White Fir Drive, approximately 1,865 feet from the reservoir.

3.5.1 Drinking Water Wells

The Ecology online well database indicates there are approximately 220 registered water wells located within 1 mile of Cle Elum Reservoir (Ecology, 2014e). Most of the wells are for domestic and community purposes, and all but two are east or south of the reservoir. Approximately 12 registered drinking water wells are located on parcels that the Cle Elum Pool Raise Project would inundate.

Table 3-4 summarizes construction details for these wells. When a well could be assigned parcel identification with confidence, Table 3-4 provides that parcel identification. Otherwise, Reclamation used information such as the tax identification, well owner name, and general well location to correlate the well with a specific property. Table 3-4 also notes the depth at which the driller first observed water. In some cases, the driller did not record groundwater observations. Words such as "water," "water bearing," "WB," "wet," and "saturated" in the well logs indicate the location where the driller observed groundwater. Other wells may exist on parcels that the project would inundate, but these could not be accurately located since many well logs lack parcel identification.

Many of the wells listed in Table 3-4 have static water levels that are higher than the formation of the well, indicating the aquifers are confined, and these wells are unlikely to have a direct hydraulic connection to the Cle Elum Reservoir. The depth at which water was first noted when drilling the well is the best available indication of the location of the water table, and wells that have open intervals near the water table are the wells most likely to reflect changes in the Cle Elum pool elevation. Based on construction information for the wells, it appears that well #504580 (installed in glacial outwash) and well #302874 (installed in bedrock) each have open intervals in shallow zones that could hydraulically connect to the Cle Elum Reservoir and could respond to the Cle Elum Pool Raise Project. It is unlikely that the remaining wells listed in Table 3-4 would respond to changes in pool height since they are located in deeper formations.

Table 3-4. Registered Water Wells on Potentially Inundated Parcels

Well Log ID	Static Water Level (ft bgs*) (Date Measured)	Interval Well is Open to Aquifer (ft bgs)	First Water-Bearing Formation Noted (ft bgs)
504580	55 (11/5/2007)	60-71	54
386601	23 (6/23/2004)	104-163	153
384354	111 (7/20/2004)	138-198	144
390619	36.5 (10/11/2004)	75-115, 375-395, 535-555	93
525859	144 (2/14/2008)	260-360	39
302873	80 (9/1/1999)	420-520	not indicated on log
666402	19.5 (7/6/2010)	275-335	16
302874	1 (7/24/1999)	20-600	not indicated on log
482929	131 (5/18/2007)	217	not indicated on log
511469	152 (12/13/2007)	375-415	389
134081	100 (11/12/1993)	158	138
410667	50 (5/17/2005)	120-220	not indicated on log

Source: Ecology (2014e)
*ft bgs = feet below ground surface

3.5.2 Onsite Septic Systems

Onsite septic systems (OSS) are permitted and managed locally by the Kittitas County Department of Health in conjunction with guidance and oversight from the Washington State Department of Health and rules contained in WAC 246-272A, Onsite Sewer Systems. The OSS regulations include both horizontal and vertical location requirements.

The horizontal requirement is that the OSS be located at least 100 feet horizontally from surface water bodies, measured from the Ordinary High Water Mark (OHWM). The Cle Elum Pool Raise Project would create a new OHWM approximately 3 feet higher than the current OHWM in some areas around the reservoir. Figures 2-3 through 2-7 indicate these new inundation areas. Kittitas County Department of Health records (2014) indicate there are 14 OSS on parcels that the Cle Elum Pool Raise Project could inundate. The actual locations of the OSS in relation to the reservoir, as judged by examination of the as-built OSS drawings on record, are summarized in Table 3-5. In some instances, the OSS as-built drawings do not specify the location of Cle Elum Reservoir, in which case comparison of drawings to Figures 2-3 through 2-7 and online Bing Maps aerial photographs were used to estimate the distance from the OSS to the newly inundated areas.

Table 3-5. Onsite Septic Systems on Potentially Inundated Parcels

Parcel ID	Estimated Distance from OSS to New Inundation (feet)	As-built Date
766336	210	8/30/1991
306935	270	7/22/1987
15495	385	3/26/2003
15489	350	7/24/2002
15488	235	10/11/2001
15487	235	9/5/2002
797135	265	10/1/1985
796935	270	10/2/2007
12048	975	1/19/1999
435036	405	6/16/1994
11596	Unknown; poor quality as-built; house and OSS not on aerials	12/11/2002
18679	350	11/7/2006
18678	260	10/20/2003
519336	425	12/19/2000

Source: Kittitas County Department of Health (2014)

As shown in Table 3-5, all known OSS locations meet the 100-foot minimum horizontal setback requirement from the higher reservoir pool.

Vertical separation requirements for OSS are site-specific, and depend on the type of OSS (e.g., pressure, gravity); soil type; depth to the water table; and depth to the first clay layer, hardpan, or bedrock. The Kittitas County Department of Health determines vertical separation requirements for each OSS, and this information does not appear in the as-built records and permit applications provided by the county.

3.6 Fish

The impact area for fish species includes habitats in Cle Elum Reservoir and its tributaries, as well as the Cle Elum River and Yakima River downstream from the reservoir. The upper Cle Elum watershed supports resident fish species and historically supported anadromous spring Chinook salmon, summer Middle Columbia River (MCR) steelhead (summer steelhead), coho salmon, and sockeye salmon as well as bull trout (Haring, 2001). Cle Elum Dam is currently a barrier to naturally returning anadromous fish. However, sockeye, coho, and spring Chinook have been introduced upstream of the dam in recent years and utilize the interim downstream fish passage facilities on the dam. The Yakama Nation traps fish returning to the reservoir from the fish capture facilities at Roza Diversion Dam.

3.6.1 Resident Fish

Resident native salmonids in the Yakima River basin include the Columbia River Distinct Population Segment (DPS) bull trout, westslope cutthroat trout, rainbow trout, kokanee, mountain whitefish, and pygmy whitefish (Pearsons et al., 1998; Hallock and Mongillo, 1998). Section 3.9.1 discusses bull trout, a species federally listed as threatened. Resident species not native to the Yakima River basin include brown trout, Eastern brook trout, and lake trout (Pearsons et al., 1998; Wydowski and Whitney, 2003).

Thirty-seven resident nonsalmonid species are present in the Yakima River basin (Pearsons et al., 1998). The most abundant of these in the upper Yakima River basin are speckled dace, longnose dace, redside shiners, northern pikeminnow, and largescale suckers (Pearsons et al., 1998).

Table 3-6 describes resident fish species occurring upstream of Cle Elum Dam (Mongillo and Faulconer, 1980; Pearsons et al., 1998; Wydowski and Whitney, 2003; Reclamation and Ecology, 2011b). Accounts of habitat use by fish species upstream of Cle Elum Dam are generally limited to summaries of presence or absence and in some cases best professional judgment (e.g., Mongillo and Faulconer, 1980). The expected patterns of habitat use described in Table 3-6 rely on information collected throughout the regional distribution of the species (e.g., Edwards et al., 1983) as well as within basin data, where available (e.g., Wydowski and Whitney, 2003).

Cle Elum reservoir is an oligotrophic (unproductive) environment with low nutrient levels, chlorophyll *a* concentrations, phytoplankton biovolume, and zooplankton densities. The low densities of zooplankton may limit the reservoir's capacity to support resident fish as well as introduced salmonids such as sockeye salmon (Reclamation, 2007). Benthic invertebrates, which also provide food for fish, are scarce in the reservoir (Mongillo and Falconer, 1982).

Table 3-6. Expected Habitat Use by Resident (Nonanadromous) Fish Species Inhabiting the Upper Yakima River Basin including Cle Elum Reservoir and Tributaries

Resident Fish Species	Shoreline Spawning	Tributary Spawning	Shallow Littoral Rearing	Open Limnetic Rearing	Deep Water or Benthic Rearing	Tributary Rearing
Kokanee	October to November	October to November	Prefers temperatures close to 50°F	Prefers temperatures close to 50°F	Diel vertical migrations between limnetic and deep-water habitats	N/E
Mountain whitefish	September to December	September to December	Yes	N/E	Yes	Typically in temperatures of 48°F to 52°F
Pygmy whitefish	From late summer to early winter, when temperature is 32°F to 39°F	From late summer to early winter, when temperature is 32°F to 39°F	Typically in temperatures less than 50°F[4]	N/E	Typically in temperatures less than 50°F[4]	Typically in temperatures less than 50°F[4]
Cutthroat trout	N/E	March to July typically in water temperatures around 50°F	Prefers water between 54°F and 59°F and less than 72°F[5]	Prefers water between 54°F and 59°F and less than 72°F[5]	Prefers water between 54°F and 59°F and less than 72°F[5]	Prefers water between 54°F and 59°F and less than 72°F[5]
Rainbow trout	N/E	February to June	Typically in water temperatures less than 70°F	Typically in water temperatures less than 70°F	Move into deep water when surface temperatures exceed 70°F	Typically in water temperatures less than 70°F
Eastern brook trout (I)	August to December when water temperatures are 40°F to 50°F at depths less than 5 feet	August to December when temperatures are 40°F to 50°F and declining	Typically in water temperatures less than 68°F	Yes; typically in water temperatures less than 68°F	Yes	Typically in water temperatures less than 68°F
Lake trout (I)	Mid-October to early December at depths of 1 to 100 feet	N/E	Prefers habitats around 50°F	Prefers habitats around 50°F	Most commonly found in deeper water; prefers habitats around 50°F	N/E

Resident Fish Species	Shoreline Spawning	Tributary Spawning	Shallow Littoral Rearing	Open Limnetic Rearing	Deep Water or Benthic Rearing	Tributary Rearing
Brown trout (I)	N/E	October to December	Occupies warmer water habitats of 65°F to 75°F	N/E	Yes	Occupies warmer water habitats of 65°F to 75°F
Longnose dace	May to late August at temperatures of 53°F to 66°F[6]	May to July	Typically found shallow water[6]	Pelagic fry[6]	N/E	Yes
Leopard dace	N/E	May to July	Observed in temperatures of 59°F to 64°F	N/E	N/E	Observed in temperatures of 59°F to 64°F
Speckled dace	N/E	June to August	Typically 32°F to 68°F	N/E	N/E	Typically 32°F to 68°F
Chiselmouth	N/E	Late May to early July	Typically 48°F to 81°F	N/E	N/E	Typically 48°F to 81°F
Redside shiner	April - July	April to July	Typically 55°F to 68°F	N/E	Typically 55°F to 68°F but moves to deep water habitats when temperatures increase	Typically 55°F to 68°F
Peamouth	Late May to June at temperatures of 50°F to 59°F; hatch in 7-8 days at 54°F	Late May to June at temperatures of 50°F to 59°F; hatch in 7-8 days at 54°F	Yes	N/E	Yes	Yes
Northern pikeminnow	Late May to early August at temperatures of 57°F to 65°F' hatch in 7 days at 64°F	Late May to early August at temperatures of 57°F to 65°F; hatch in 7 days at 64°F	Yes	Distributed throughout water column in summer	Typically benthic in winter	Yes
Largescale sucker	N/E	Early April to July; observed spawning at depths of 8 inches to 9 feet	Primarily found in shallow water	Pelagic larvae and fry	Uses deep water thermal refugia in summer	Congregates in areas where streams enter lakes
Mountain sucker	N/E	June to July at temperatures of 48°F to 66°F	Typically 55°F to 70°F	N/E	N/E	Typically 55°F to 70°F

Resident Fish Species	Shoreline Spawning	Tributary Spawning	Shallow Littoral Rearing	Open Limnetic Rearing	Deep Water or Benthic Rearing	Tributary Rearing
Bridgelip sucker	N/E	Mid-April to mid-June at temperatures 46°F to 59°F	N/E	N/E	N/E	Yes
Burbot	Late winter through early spring at temperatures of about 35°F	Late winter through early spring at temperatures of about 35°F	Moves to shallow water during winter	Pelagic larvae[7]	Summer distribution in deeper waters	N/E
Threespine stickleback	May to August; hatch in 7 days at 64°F	May to August; hatch in 7 days at 64°F	Yes	Yes	Yes	Yes
Paiute sculpin	May to June	May to June	Observed in warmer water at 59°F to 77°F	N/E	Observed in warmer water at 59°F to 77°F	Observed in warmer water at 59°F to 77°F
Torrent sculpin	April to June	April to June	Yes	N/E	N/E	Observed at temperatures of 59°F to 72°F
Mottled sculpin	N/E	February to June in water of 39°F to 59°F; eggs hatch in 20 to 30 days at temperatures of 50°F to 60°F.	N/E	N/E	N/E	Yes

Table notes:

1. Nonnative, introduced species are identified by a parenthetic “I” following species name.
2. Not expected is denoted by “N/E”
3. Wydowski and Whitney (2003) provided the data presented in the table except where other sources are noted.
4. Hallock and Mongillo, 1998
5. Hickman and Raleigh, 1982
6. Edwards et al., 1983
7. Bonar et al., 2000

3.6.2 Anadromous Fish

Construction of a temporary timber crib dam at Cle Elum Reservoir contributed to the extirpation (local extinction) of sockeye from the basin in the early 1900s. In 1935, Reclamation finished construction of Cle Elum Dam without fish passage facilities, effectively eliminating access to previously productive spawning and rearing habitat for sockeye salmon, coho salmon, spring Chinook salmon, and summer steelhead above the dam (Bryant and Parkhurst, 1950; Davidson, 1953; Fulton, 1970; Mullan, 1986). Pacific lamprey were also eliminated above the dam (Reclamation and Ecology, 2011b). The lack of passage has isolated local populations of bull trout as described in Section 3.9.1.

In spring 2005, Reclamation constructed an interim downstream fish passage facility at Cle Elum Dam. Reclamation has not installed upstream fish passage facilities, but the Yakama Nation captures sockeye and spring Chinook at Roza Dam and transports them by truck to Cle Elum Reservoir. The downstream interim fish passage facility has allowed the Yakama Nation to reintroduce coho, spring Chinook, and sockeye salmon above the dam. Since 2005, Reclamation has worked collaboratively with Ecology, WDFW, and the Yakama Nation to plan for construction of a permanent fish passage facilities at Cle Elum Dam and to solidify plans for fish reintroduction above the dam. Reclamation is currently developing final designs for the fish passage facilities.

The following sections describe anadromous fish present in the Cle Elum River, Cle Elum Reservoir, or both. Summer steelhead and bull trout are also present in the area; these species are listed under the ESA and are described in Section 3.9.

3.6.2.1 Sockeye

Historically, sockeye salmon runs in the Yakima River basin were larger than any other fish runs in the Columbia River Basin (Reclamation, 2008a). Sockeye depend on lakes for juvenile rearing, and historic Cle Elum Lake was once an important habitat area for this species (Reclamation, 2007). The reintroduction of sockeye salmon into Cle Elum Reservoir began in 2009 with the release of 1,000 pairs of adult sockeye by the Yakama Nation. The Yakama Nation trapped the mixed Wenatchee and Lake Osoyoos stocks of sockeye at Priest Rapids Dam. Since 2009, the number of sockeye transported from Priest Rapids Dam to Cle Elum Reservoir has increased to 4,100 in 2010; 4,500 in 2011; 10,000 in 2012; 4,000 in 2013; and 10,000 in 2014, due, in part, to larger numbers of sockeye passing above Bonneville Dam (Yakama Nation Fisheries, 2014a). In addition, the Yakama Nation counted approximately 80,000 out-migrating sockeye smolts at Prosser Dam in 2011, the most recent year for which data are available.

During the months of July through September, high water temperatures and low flow conditions restrict passage of sockeye in the lower Yakima River particularly between Sunnyside Dam and Prosser Dam. Recent fish counts from Prosser Dam illustrate that fish passage is low during the warmest summer months, but a temporary reduction in temperature may stimulate large passage events (Hubble, 2015).

In 2013, the first offspring of the adult sockeye originally reintroduced to Cle Elum Reservoir returned to Roza Dam, where they were collected and transported to Cle Elum Reservoir (Yakama Nation Fisheries, 2014a). The number of adult sockeye counted at Roza Dam was 701 in 2013, and 2,517 in 2014.

3.6.2.2 Coho

Factors such as construction of dams on the Columbia River and overharvest of wild stocks contributed to the extirpation in the early 1980s of coho salmon endemic to the Yakima River basin. However, natural reproduction of hatchery-reared coho is now occurring in both the Yakima and Naches rivers.

Currently, coho enter the Yakima River in fall with about 10 to 20 percent of the adults reaching the upper watershed between Cle Elum and Easton in November and December. Spawning occurs soon afterward; the eggs incubate over the winter and hatch in the spring. After the fry emerge from the gravel, the juveniles rear in the stream until the following spring, when they outmigrate as 1-year-old smolts (Reclamation, 2008a).

Coho salmon were reintroduced into Cle Elum Reservoir to test the interim downstream passage facility. In 2005, the Yakama Nation released small test groups of passive integrated transponder (PIT)-tagged coho salmon smolts directly into the passage facility. PIT tagging uses implanted microchips to monitor smolt survival and the adult returns. A large-scale test was conducted in 2006 when about 10,000 PIT-tagged smolts were released from net pens near Cle Elum Dam; 617 coho salmon were detected as they passed the interim passage flume. WDFW concluded that nearly 10 percent of the smolts had survived and migrated the next spring. In suitable habitats upstream of Cle Elum Reservoir, the Yakama Nation has released 500,000 spring fry and summer parr coho, in addition to smaller releases of smolts, (Reclamation and Ecology, 2011c).

3.6.2.3 Spring Chinook

An estimated 12 percent of the adult natural spring Chinook salmon that spawn in the upper Yakima River basin do so in the 8-mile reach of the Cle Elum River downstream from the dam (Reclamation, 2008a). All Yakima River stocks of spring Chinook salmon exhibit an extensive downstream migration of presmolts in the late fall and early winter (Pearsons et al., 1996; Berg and Fast, 2001). Most juvenile spring Chinook salmon in the upper Yakima River basin migrate downriver during fall and winter, overwintering in the Yakima River between Roza and Prosser Diversion Dams (Berg and Fast, 2001).

Adult spring Chinook salmon return to the upper mainstem Yakima River beginning in May. Adults migrate close to the area where they will spawn and find a place to hold in cover (deep water with woody debris, undercut banks, or both) until they spawn. Depending on water temperature, the peak of spawning activity for spring Chinook salmon in the upper mainstem Yakima River is from September 15 to October 1 (Fast et al., 1991). Adults that spawn in the upper reaches of tributaries typically move into the tributaries by the end of June or early July when flows are still high enough for them to traverse the lower reaches of the tributaries. Some migrating adult fish arrive early, before tributary streams become intermittent in the summer. They remain until fall precipitation begins, allowing the fish to pass the parts of the streams that eventually go dry for a period of time. Timing of spawning runs for all salmon and steelhead is delayed during years of high flow and accelerated in years of low flow (Reclamation, 2008a).

The Yakama Nation is currently reintroducing spring Chinook to habitats above Cle Elum Dam. Under this project, the Yakama Nation collects returning spring Chinook at Roza Dam and transports them to Cle Elum Reservoir. The Yakama Nation transported 132 adults and 7 jacks (fish that return 1 or 2 years earlier than adults) in 2012, and 140 adults and 93 jacks in 2013 (Bosch, 2014).

3.6.2.4 Pacific Lamprey

Pacific lamprey are rare in the Yakima River basin and little is known about their life history, historical distribution, or current limiting factors. The Yakama Nation is developing a long-term management and action plan specific to Pacific lamprey, and is considering the reintroduction of the species in areas above Cle Elum Dam. The Yakama Nation is developing the plan in cooperation with local and regional government entities and other ongoing efforts conducted by the Nez Perce, Umatilla, and Warm Springs Tribes. The plan is consistent with the Columbia River Inter-Tribal Fisheries Commission's Pacific lamprey Tribal restoration plan, the Service Conservation Initiative, and the lamprey management plans of Chelan County, Douglas County, and Grant County Public Utility Districts (Yakama Nation Fisheries, 2014b).

3.7 Vegetation and Wetlands

The impact analysis area for vegetation communities, wetlands, Survey and Manage[1], sensitive species, and invasive species includes the following areas:

- The existing Cle Elum Reservoir up to elevation 2,240
- Areas encompassed by the proposed maximum pool elevation up to 2,243 feet
- Vegetation adjacent to the increased inundation zone landward of elevation 2,243
- Areas that would be impacted by proposed shoreline protection and other construction activities as described in Chapter 2

Visits to selected sites on the east side of Cle Elum Reservoir in November 2013 document general characteristics of vegetation and wetland communities in the analysis area. Reclamation has not conducted formal wetland delineations or a plant survey for this FEIS.

[1] Survey and Manage is a set of standards and guidelines associated with the 1994 Northwest Forest Plan to mitigate potential effects to approximately 400 species thought to be closely associated with late-successional and old growth forests.

3.7.1 Vegetation

The Cle Elum Reservoir watershed is comprised of approximately 50 percent mature forest habitat within the western hemlock, Pacific silver fir, and mountain hemlock forest cover types (USFS, 1993; Service, 1997). The upper third of Cle Elum Reservoir is surrounded by these cover types. The remainder of the reservoir is surrounded by the forest cover type of moist grand fir, with the exception of a small area near Cle Elum Dam dominated by ponderosa pine (Service, 1997).

The shoreline below the current maximum pool elevation 2,240 is generally rocky and vegetation is affected by the fluctuating water levels of reservoir operations. The west side of the reservoir is typically more steeply sloped, with little vegetation established below elevation 2,240. With the exception of vegetation associated with inventoried wetlands (Section 3.7.2), the area below elevation 2,240 is mostly devoid of vegetation. However, patches of deciduous trees and shrubs, including black cottonwood, red alder, and willows, are present in certain places, particularly at the Cle Elum River delta in the northern portion of the reservoir and along the more gently sloped shoreline of eastern side of the reservoir.

In the area that would be subject to seasonal inundation (between elevations 2,240 and 2,243), various vegetation communities are present. Near the existing dam and appurtenant structures, as well as developed recreational properties and facilities in the south and southeast portion of the reservoir, vegetation is sparse and consists mainly of scattered groundcover. A mature conifer forest landward of elevation 2,240 dominates less-developed areas of the reservoir, including most of the west shoreline. The predominant tree species is Douglas-fir, with ponderosa pine, grand fir, and western red cedar also present (Service, 1997). Understory species include snowberry, serviceberry, hazelnut, bitterbrush, Oregon grape, kinnikinnick, balsamroot, lupine, strawberry, and native grasses (Service, 1997). The Cle Elum River Campground supports patchier stands of coniferous forest landward of elevation 2,240; areas of paved road and primitive campgrounds with patchy grass and herbaceous cover are common in this area.

Vegetative cover also varies in the locations proposed for additional shoreline protection measures described in Chapter 2. Several areas are relatively unvegetated or marked by existing shoreline armoring, while other areas are characterized by alders, black cottonwood, Douglas-fir, ponderosa pine, and a variety understory species.

3.7.2 Wetlands

Reclamation identified the extent of wetlands within the analysis area using the National Wetland Inventory (NWI) (Service, 2013). Most of Cle Elum Reservoir is a lacustrine (freshwater lake) feature, which is deepwater habitat that exceeds 20 acres in size and lacks trees, shrubs, or emergent vegetation (Cowardin et al., 1979). Landward of the areas inventoried as lacustrine, the NWI maps show approximately 188 acres of palustrine wetlands at or below the current maximum pool elevation of the reservoir, as shown on Figure 3-8. A palustrine wetland is a freshwater wetland dominated by rooted or nonrooted vascular and nonvascular plants, although some palustrine wetlands may also lack vegetation (Cowardin et al., 1979). The NWI maps note areas around the reservoir shoreline mapped as lacustrine wetland that are actually palustrine wetlands with emergent and scrub-shrub vegetation communities (Service, 1997).

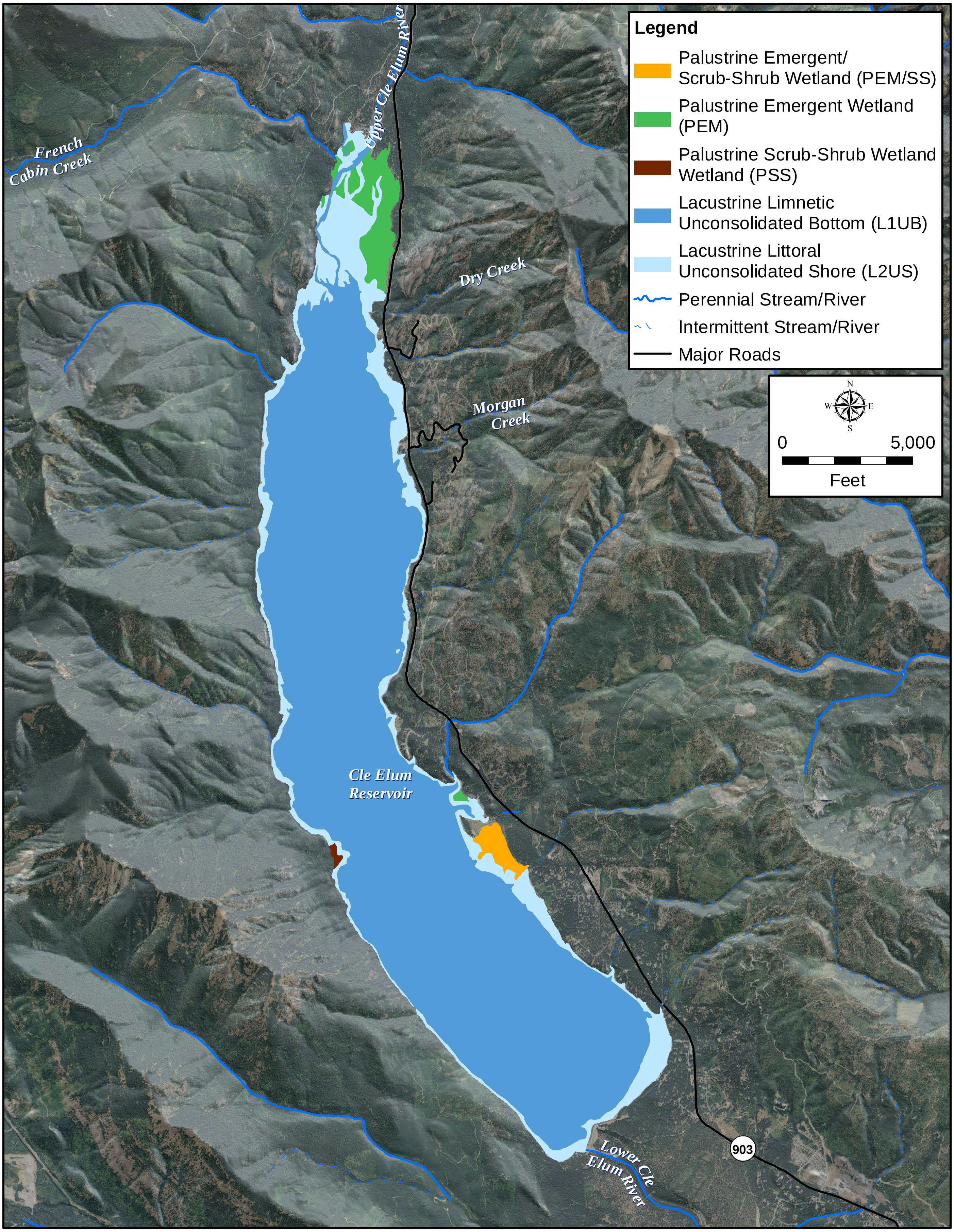

Figure 3-8. Wetlands in the Project Area

Most of the mapped palustrine wetlands (approximately 140 acres) are found at the north end of the reservoir near Cle Elum River Campground. Mapped wetlands are also located at Wish Poosh Campground and a small area on the west side of the reservoir. The palustrine wetlands typically occur on more gently sloped shoreline segments along the reservoir, and near the mouth of the Cle Elum River. Steep shoreline topography generally precludes the development of extensive vegetated wetland communities along the west side of the reservoir. The predominant wetland vegetation class in the area is emergent, and predominant plant species include numerous flood-tolerant grasses, rushes, and sedges (Service, 1997). Several large stands of black cottonwood trees are interspersed among emergent vegetation communities at the north end of the reservoir. Small patches of palustrine scrub-shrub wetlands also occur in the area. Dominant species in this vegetation community include scattered black cottonwood and alder saplings, willows, red osier dogwood, vine maple, rose, and spirea.

The NWI mapped approximately 2 acres of palustrine wetlands in the area that the higher reservoir level would inundate. These wetlands are located primarily in the north portion of Cle Elum Reservoir. The majority of these inventoried wetlands are emergent wetland; the remaining wetlands are freshwater forested and shrub wetland. None of the areas proposed for shoreline protection are identified in the NWI inventory as palustrine wetland.

3.7.3 USFS Survey and Manage and Special Status Species

The Okanogan-Wenatchee National Forest manages vascular plants, nonvascular plants, and fungi identified in the Survey and Manage standards and guidelines, which are a mitigation measure included in the 1994 Northwest Forest Plan. The USFS and Bureau of Land Management (BLM) adopted the Survey and Manage standards and guidelines to conserve rare and little known flora and fauna species thought to be associated with late successional and old growth forests within the range of the northern spotted owl. These standards and guidelines are applicable to USFS and BLM land within the geographic boundaries of the Northwest Forest Plan area (western Oregon, Washington, and northern California). The standards and guidelines require surveys for Survey and Manage species if disturbance of late successional or old growth habitat is proposed within the designated Northwest Forest Plan area. Some species require preproject surveys and prescribed management actions, if found.

Table D-1 in Appendix D provides a list of the USFS Survey and Manage vascular plant species either documented near the Cle Elum Reservoir or that could potentially occur within the reservoir study area.

3.7.4 Special Status Species

The USFS maintains a Regional Forester's Special Status Species list, which includes federally listed, federally proposed, sensitive, and strategic species, collectively referred to as "Special Status Species" (USFS, 2011b). Special Status Species in the Okanagan-Wenatchee National Forest include those species designated as endangered, threatened, or sensitive by the DNR Natural Heritage Program. Strategic species include those that are not federally listed or State sensitive whose distribution, habitat, threats, or taxonomy are poorly known

(USFS, 2011b). Table D-2 in Appendix D lists identified sensitive and strategic species near the Cle Elum Ranger District and locations of potential suitable habitat in the impact analysis area.

The DNR (2014) Natural Heritage Program database documents western ladies'-tresses, Thompson's chaenactis, and Canadian single-spike sedge in the Cle Elum Reservoir basin. Western ladies'-tresses grow along streams. The mapped location for this species in the Cle Elum River basin is near a headwater tributary of the Cle Elum River located approximately 2 miles from the river and 3 miles from the reservoir (DNR, 2014). The DNR mapped Canadian single-spike sedge in close proximity to the western ladies'-tresses occurrence. This sedge typically grows on rocky outcrops at elevations higher than those of the study area. Thompson's chaenactis grows on dry rocky slopes and ridges. Because these species are not likely to be present in the reservoir area, they are not evaluated in this FEIS. In addition, WDFW identified populations of Oregon goldenaster, a State Threatened species, along the Cle Elum River in the north portion of the study area. Oregon goldenaster is a perennial aster that typically occurs on sand and gravel bars along rivers; seasonal river flooding is a key component in maintaining suitable habitat for this plant species (DNR, 2015). Section 3.9 discusses federally listed species.

3.7.5 Invasive Species

A wide range of invasive plant species is present near Cle Elum Reservoir. Kittitas County lists some species as noxious weeds and the USFS Cle Elum Ranger District considers some as priority weeds. Documented occurrences of invasive species in the reservoir area include diffuse knapweed, St. John's wort, Scotch broom, oxeye daisy, Canada thistle, common tansy, Dalmatian toadflax, and bull thistle (Lau, 2012). Table D-3 in Appendix D summarizes the invasive plant species that occur or may occur in the reservoir vicinity.

3.8 Wildlife

Wildlife habitats near Cle Elum Reservoir include mixed conifer forests, forested wetlands, and shrub-dominated wetlands. For this FEIS, the impact analysis area for wildlife and wildlife habitat is similar to that for vegetation and wetlands (Section 3.7) and includes the following:

- The existing Cle Elum Reservoir up to elevation 2,240
- Areas encompassed by the proposed maximum pool elevation up to 2,243
- Wildlife habitat adjacent to the inundation zone landward of elevation 2,243
- Areas that would be impacted by proposed shoreline protection and other construction activities as described in Chapter 2
- Areas around the reservoir that would experience increased noise or traffic associated with construction

Conifer forests surrounding the reservoir are relatively undisturbed. They are situated on sloping terrain and typically have a multistoried canopy; downed wood; and a developed understory of diverse shrubs, herbaceous species, and native grasses. Some areas lack an understory and have a denser shrub layer. In general, the surrounding forests provide high-quality connected habitats for a variety of native wildlife, including elk, deer, black bear, small mammals (e.g., beaver, marten, chipmunk), raptors, owls, grouse, woodpeckers, and a wide range of songbird species (Service, 1997). Wetlands located at the north end of the reservoir provide habitat for mammals; reptiles; amphibians; and migratory birds such as grosbeak, swallows, sparrows, belted kingfisher, and warblers. The reservoir itself provides open-water habitat for ducks, geese, and other water birds (e.g., pied-billed grebe and goldeneye), although fluctuating water levels from reservoir operations preclude suitable conditions for waterfowl nesting along much of the shoreline. The shoreline contains intermittent eroding bluffs, vegetated low areas, and gravelly as well as more stable banks.

3.8.1 State Species of Concern

The WDFW Priority Habitats and Species database identifies State Species of Concern, including species listed as threatened or endangered by the State (WDFW, 2014b). Table 3-7 lists the WDFW priority species with documented occurrences in the vicinity of Cle Elum Reservoir. Priority large and small mammal species that have the potential to migrate through the impact analysis area are also shown. Other State priority species, such as pileated and white-headed woodpeckers, great blue heron, and common loon are likely to occur because suitable habitat is present. The WDFW priority habitats in the analysis area include riparian; elk, white-tailed deer, and mountain goat habitat; cliffs; and wetlands (WDFW, 2014b).

Table 3-7. State-Listed Wildlife Species of Concern Documented Near Cle Elum Reservoir

Species	State Status
Canada lynx	Threatened
Elk	None[1]
Fisher	Endangered
Gray wolf	Endangered
Great gray owl	Monitor
Grizzly bear	Endangered
Larch mountain salamander	Sensitive
Northwest white-tailed deer	None[1]
Marten	None[1]
Mountain goat	None[1]
Tailed frog	Monitor
Northern goshawk	Candidate
Bald eagle	Sensitive
Northern spotted owl	Endangered
Wolverine	Candidate

[1] Species is not state-listed, but is a WDFW Priority Species of Recreational, Commercial, and/or Tribal Importance.

Section 3.9 discusses federally listed species, including the gray wolf, grizzly bear, and northern spotted owl.

3.9 Federal Threatened and Endangered Species

The area of impact analysis for threatened and endangered species includes Cle Elum Reservoir; the Cle Elum River upstream and downstream from the reservoir; the Yakima River downstream from the reservoir, and land surrounding the reservoir that could impacted by construction noise, construction traffic, habitat disruption, or project operation. Table 3-8 lists the fish and wildlife species that are federally listed or proposed for listing as threatened or endangered species under the ESA and that have the potential to occur in the area of impact analysis. Table 3-8 also identifies those fish and wildlife species that have federally designated or proposed critical habitat in the analysis area. The Federal species lists were obtained from the Service and NMFS in June 2014.

Table 3-8. Species Federally Listed or Proposed for Listing that Potentially Occur Near Cle Elum Reservoir

Species	Federal Status	Critical Habitat
Bull trout - Columbia River DPS	Threatened	Yes
Steelhead - Middle Columbia River DPS	Threatened	Yes
Canada lynx	Threatened	No
Gray wolf	Endangered	No
Grizzly bear	Threatened	No
Marbled murrelet	Threatened	No
Northern spotted owl	Threatened	Yes
Yellow-billed cuckoo	Proposed Threatened	--
Ute ladies'-tresses	Threatened	No

DPS = distinct population segment

Federally listed species potentially affected by the Cle Elum Pool Raise Project would include all listed aquatic species, species that are unable to avoid rising pool elevations, species that may be using habitat that would be inundated by the higher reservoir for breeding purposes, and species that would be affected by construction activities. The sections below provide a more complete description of each listed species. Some of the species identified in Table 3-8 do not have suitable habitat within the impact analysis areas or are highly mobile and would otherwise be unaffected by the Cle Elum Pool Raise Project construction activities or higher reservoir elevations. These species include grizzly bear, Canada lynx, gray wolf, yellow-billed cuckoo, and Ute ladies'-tresses. Section 3.9.4 explains why further evaluation of these species is not included in this FEIS.

3.9.1 Bull Trout

In June 1998, the Service listed the Columbia River Basin DPS of bull trout as threatened under the ESA (63 FR 31647). The Service at that time identified eight subpopulations in the

Yakima River basin, including isolated populations in Cle Elum Reservoir; this population appears to be small.

The Service designated critical habitat for bull trout in 2005 (70 FR 56212). Bull trout require cold clear water with stable channels and adequate cover (Thurow,1987; Ziller, 1992). Designated critical habitat in 2005 included the Cle Elum River from the confluence with the Yakima River upstream to the downstream side of the spillway at Cle Elum Reservoir, several small segments of the Cle Elum River above the reservoir, and some portions of Cle Elum River tributary streams above the reservoir. On October 18, 2010, the Service revised the critical habitat by adding Cle Elum Reservoir and additional habitat upstream of the reservoir (75 FR 200).

Bull trout occurred historically throughout most of the Yakima River basin. Today, however, they are fragmented into relatively isolated populations. Although bull trout were probably never as abundant as other salmonids in the basin, due in part to their requirement for cold clear water, they were likely more abundant and more widely distributed than they are today (WDFW, 1998).

Three bull trout life history forms are present in the Yakima River basin: adfluvial (migrate to lakes), fluvial (migrate to rivers), and resident. Adfluvial and fluvial fish reside in lakes and mainstem rivers, respectively, during part of the year. Fry and juveniles rear in their natal streams for 1 to 4 years before migrating downstream into lakes or mainstem river systems. Adults migrate back into tributary streams to spawn, after which they return to the lake or river. A bull trout of the resident life history form resides in a particular stream for its entire life cycle.

Tributary spawning for adfluvial bull trout occurs in late August to late December when water temperatures drop below 48°F. Shallow littoral rearing, open limnetic rearing, and tributary rearing typically occur in habitats where temperatures do not exceed 59°F.

The lack of fish passage at Cle Elum Dam has isolated local populations of bull trout. The dam eliminated interconnectedness and the exchange of genetic material among populations, and prevented the recolonization of populations diminished by potential catastrophic natural events above the dam (Reclamation and Ecology, 2011b; Reiss et al., 2012). An adfluvial population could still be present in Cle Elum Reservoir. However, no spawning population has been documented in the upper Cle Elum basin since 2000 (Service, 2002; Reiss et al., 2012). Adfluvial bull trout may have been replaced by nonnative lake trout, which have been naturally reproducing in Cle Elum Reservoir since being stocked in the 1920s.

A fluvial bull trout population is present in the mainstem Yakima River although few bull trout have been recorded in the mainstem above Roza Diversion Dam. Bull trout are late summer and early fall spawners and most spawning activity in the Yakima River basin occurs from early September through early October. However, spawning may occur as early as August or as late as early November. For the migratory life history forms, spawning migration can begin as early as mid-July when adults move upstream to hold in deep pools, or it may occur just prior to spawning.

Bull trout do not spawn in the Cle Elum River below Cle Elum Dam (Easterbrooks, 2009). Fluvial juveniles and subadult bull trout may rear in the area, but this use has not been documented.

The primary downstream migration period for juvenile bull trout from their natal tributaries into lakes or rivers occurs from June through November. The early summer migration appears to be in response to increased flows and may correspond with a switch in prey from invertebrates to fish. The fall migration appears to be primarily in response to decreasing water temperatures and the need to find suitable overwintering habitat (Fraley and Shepard, 1989; Murdoch, 2002).

The most severe threat to this population appears to be low abundance. It is uncertain whether bull trout are still present in the Cle Elum drainage basin, as their presence was last documented in 2002 (Reiss et al., 2012). However, bull trout may be present within Cle Elum Reservoir, given the presence of adequate habitat in the Cle Elum drainage and subsequent identification of the Cle Elum Reservoir as designated critical habitat, historical documentation of presence, and other anecdotal factors.

3.9.2 Middle Columbia River Steelhead

The steelhead population in the Yakima River basin is a component of the Middle Columbia River (MCR) Distinct Population Segment steelhead that was listed as threatened in 1999 (64 FR 14517). Four genetically distinct spawning populations of wild steelhead have been identified in the Yakima River basin, one of which spawns in the upper Yakima River and its tributaries (Phelps, et al., 2000). Critical habitat designated for the MCR steelhead includes the Cle Elum River downstream from Cle Elum Dam (70 FR 52630).

As noted in Section 3.6, Cle Elum Dam lacks upstream fish passage to allow steelhead to spawn in habitats upstream of the dam. The Yakama Nation plans to reintroduce steelhead to Cle Elum Reservoir in the future, as described in the *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project EIS* (Reclamation and Ecology, 2011b).

Adult MCR steelhead return to the upper Yakima River between September and June, with the majority passing the Roza Diversion Dam in March and April (Karp et al., 2009). Generally, adult MCR steelhead migration into the Yakima River basin begins in late summer and peaks in late October. Another peak occurs starting in late February or early March, following a relatively inactive period during the coldest winter water temperatures. Typically, steelhead spawn earlier in the warmer water of lower elevations rather than in the colder water of higher elevations. Overall, most spawning occurs between March and May (Hockersmith et al., 1995), although WDFW personnel have observed steelhead spawning as late as July in the Teanaway River, a tributary to the upper Yakima River outside the analysis area.

Yakima River basin steelhead typically spawn in complex, multichannel reaches that have a moderate gradient of about 1 to 4 percent (Berg and Fast, 2001). Using radiotelemetery to examine the distribution of spawning steelhead in the upper Yakima River, Karp et al. (2009) found 37.7 percent using habitats in the mainstem Yakima River and 62.3 percent using tributaries. The study found that 3.4 percent of the steelhead used the Cle Elum River for spawning. Karp et al., (2009) estimated that at least 1.8 percent of spawning steelhead in the upper Yakima River are repeat spawners. Spawning data are rare for the Cle Elum River, but in May 2014, nine steelhead redds were observed downstream of the Cle Elum Dam (Thomas, 2014). Figure 3-9 illustrates the steelhead counts at Roza Dam from 2000 to 2014.

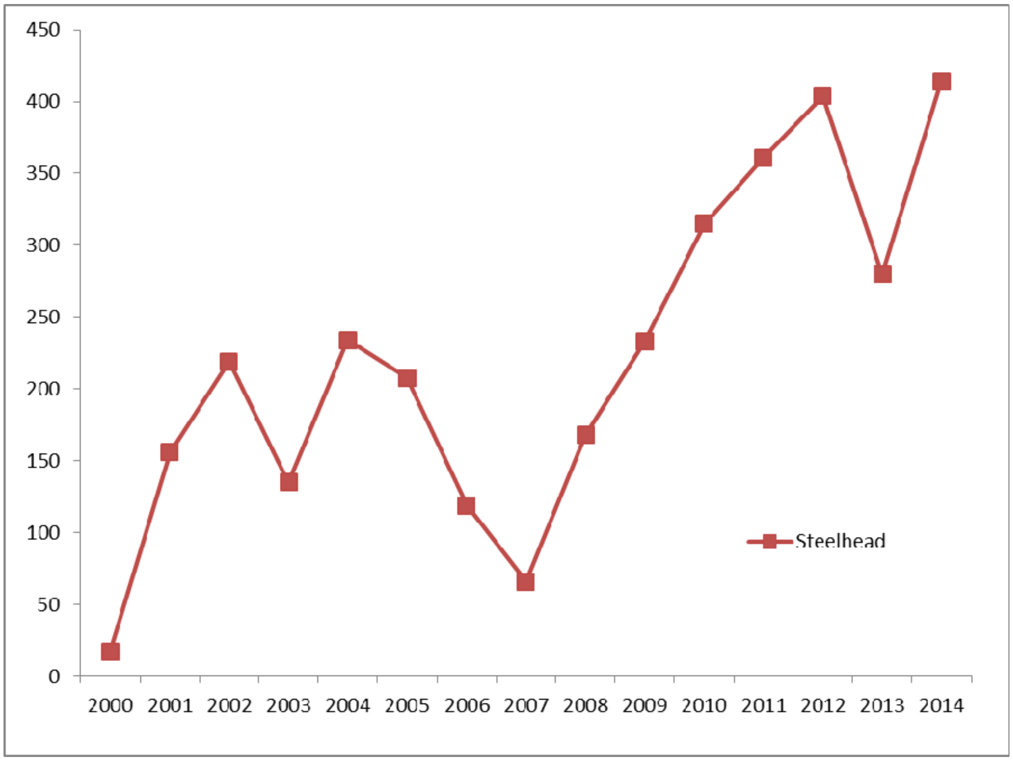

Figure 3-9. Steelhead Counts at Roza Dam from 2000 to 2014
Source: Yakima Klickitat Fisheries Project (Columbia River DART, 2015)

Juvenile steelhead emerge from the gravel between June and August and rear in the areas near where they were spawned for 1 to 4 years before migrating to the sea. Juvenile steelhead utilize tributary and mainstem reaches throughout the Yakima River basin as rearing habitat and use faster and deeper water as they grow. Some downstream movement begins in November, but the peak smolt outmigration occurs between mid-April and May (Reclamation and Ecology, 2011c).

3.9.3 Northern Spotted Owl

The northern spotted owl was listed as a threatened species by the Service in 1990, primarily due to widespread habitat loss and inadequate protective mechanisms. Northern spotted owls generally rely on older forested habitats because such forests contain the structures and characteristics required for nesting, roosting, and foraging. Features that support nesting and roosting typically include a moderate to high canopy closure (60 to 90 percent); a multilayered, multispecies canopy with large overstory trees (with diameter at breast height greater than 30 inches); a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (Thomas et al., 1990). Forested stands with high canopy closure also provide thermal cover (Weathers et al., 2001) and protection from predators. Spotted owls forage on wood rats, mice, bats, and occasionally small birds, moths, crickets, and large beetles.

The Service published a *Final Revised Critical Habitat for the Northern Spotted Owl* in 2008. That plan established a network of managed owl conservation areas (MOCAs) across the range of the northern spotted owl. As described in the Yakima River Basin Water Storage Feasibility Study EIS (Reclamation, 2008b), the northern half of Cle Elum Reservoir lies within a proposed MOCA and the southern half lies within a proposed conservation support area (CSA) under the initial recovery plan (Service, 2008). However, the initial 2008 recovery plan was later remanded in 2008 after a court challenge and investigation.

In 2011, the Service released the *Revised Recovery Plan for the Northern Spotted Owl* (Service, 2011b). The 2011 plan retains elements of the 2008 version of the plan, including a strategy to assess and address threats from barred owls and support for forest restoration techniques. However, based on scientific peer review comments on the recovery plan, the Service is not incorporating the previously recommended MOCA network or CSA and critical habitat designations into the revised recovery plan. The revised recovery plan states that in the interim, Federal land managers should continue to implement the standards and guidelines of the *Northwest Forest Plan* as well as fully considering other recommendations in the *Revised Recovery Plan for the Northern Spotted Owl* (Service, 2011b). The Service updated critical habitat designations to address new threats and to incorporate emerging science regarding habitat management in fire-prone areas as part of a rulemaking process published on December 4, 2012 (Service, 2012a).

Despite Federal and State protections, northern spotted owl populations appear to have continued declining, based on results from population trend analysis in four areas of Washington, including the vicinity of Cle Elum Reservoir (Anthony et al., 2006; Forsman et al., 2011). Nesting northern spotted owl have been documented north and east of Cle Elum Reservoir. There are also historical nesting records on the west side of the reservoir. The closest currently occupied nest is approximately 1.5 miles northeast of the north end of the reservoir (Garvey-Darda, 2014). Designated critical habitat for the northern spotted owl includes the majority of forested habitats on the west and north side of Cle Elum Reservoir and much of the area between the reservoir and Kachess Reservoir (depicted by the Service online mapper available at http://ecos.fws.gov/crithab/).

3.9.4 Additional Species

The following sections briefly describe additional federally listed species that may occur in the analysis area, but are not likely to be affected. The expected absence of effect is due to lack of suitable habitat and to specific life history traits.

3.9.4.1 Canada Lynx

Canada lynx may be present in the analysis area, but are uncommon or rare (WDFW, 2013). Lynx generally require habitat consisting of moist boreal forests with cold, snowy winters. In Washington, this habitat is generally located above 4,000 feet. The Cle Elum Reservoir is located at roughly elevation 2,200, and the surrounding area is unlikely to support lynx populations. Home ranges for lynx are relatively large, ranging from 12 to 83 square miles (Service, 2014). Denning areas in Washington occur in old stands (more than 200 years old) of lodgepole pine, Engelmann spruce, and subalpine fir (Koehler and Brittell, 1990; Koehler, 1990; Stinson, 2001), none of which occur in the analysis area. There is no federally designated critical habitat near the reservoir and it is unlikely that the project would affect this species.

3.9.4.2 Gray Wolf

Gray wolves are rare within the analysis area, as they typically avoid human activity. The majority of wolf packs in Washington are concentrated in the northeast corner of the State, although two packs are located near the Cascade crest between Interstate 90 (I-90) and Highway 2 (Becker et al., 2014). The Teanaway pack occupies a range that may include portions of the impact analysis area, though the majority of the range is located east of Cle Elum Reservoir (Becker et al., 2014).

3.9.4.3 Grizzly Bear

According to recent estimates, the North Cascade grizzly bear population is likely less than 20 individuals (Service, 2011a). Few recent credible sightings and reports exist in the North Cascades recovery zone. Grizzly bears inhabit a large home range (110 to 500 square miles) that varies in size and composition depending upon season, reproductive status, and environmental factors. Critical habitat, including mating and denning locations, is not present near Cle Elum Reservoir. In addition, the habitat abutting Cle Elum Reservoir is not ideal for grizzly bears, which prefer locations not affected by human disturbance, including vehicle traffic (Waller and Servheen, 2005).

3.9.4.4 Marbled Murrelet

The Service listed the marbled murrelet as a threatened species in 1992 because of declining abundance and habitat degradation in the southern portion of its range (Ralph et al., 1995). Marbled murrelets are marine birds that forage in nearshore environments from northern California through Alaska. They nest in mature coniferous forests west of the Cascade crest at low to moderate elevations (Smith et al., 1997). The Cle Elum Reservoir is located near the eastern extent of the breeding range for marbled murrelet. Less than 6 percent of marbled murrelet detections occur in locations more than 40 miles away from the marine environment; the most inland nest documented in Washington is approximately 55 miles from the ocean (WDFW, 2013).

The Service has designated critical habitat for the marbled murrelet, but none occurs in the Cle Elum area. The closest block of habitat is approximately 16 miles northwest of the analysis area on the west side of Keechelus Reservoir (depicted by the Service online mapper available at http://ecos.fws.gov/crithab/). Data from the WDFW Gap Analysis Program indicate that suitable habitat for marbled murrelet is present in the northern half of Kachess Reservoir and all of Keechelus Reservoir (Smith et al., 1997). While it is possible that marbled murrelet occur in the project vicinity, the distance between the Cle Elum Reservoir and marbled murrelet foraging habitat likely precludes the analysis area from supporting suitable nesting habitat.

3.9.4.5 Yellow-billed Cuckoo

The yellow-billed cuckoo requires large blocks (greater than 25 acres) of dense cottonwood and willow bottomlands with thick understory growth. Cle Elum Reservoir is adjacent to large tracts of mixed-age stands of coniferous forest with small amounts of scattered willows and cottonwoods along the reservoir margin and along the floodplain habitats of the upper Cle Elum River. The yellow-billed cuckoo is unlikely to be found in the small and isolated pockets of potentially suitable habitat in the impact analysis area. In addition, the northern limit of the breeding range for the western yellow-billed cuckoo is in California, perhaps extending into southern Oregon.

3.9.4.6 Ute Ladies'-tresses

Ute ladies'-tresses grow in moist soil near riparian areas, lakes, moderately moist (mesic) to wet meadows, river meanders, and perennial spring habitats. Ute ladies'-tresses were first found in Washington State in Okanogan County in 1997. At present, there are no known populations of Ute ladies'-tresses within the Cle Elum Ranger District (Lau, 2012). For this reason, the species is not further evaluated in this FEIS.

3.10 Visual Quality

This section describes the visual quality setting of the Cle Elum Reservoir area. Because the reservoir is located within the Okanogan-Wenatchee National Forest, this section describes visual quality in the context of USFS visual criteria. The area of potential impact for visual quality includes views of Cle Elum Dam, Cle Elum Reservoir, and the surrounding shoreline.

3.10.1 Existing Visual Setting

Cle Elum Reservoir was originally a natural glacial lake located within the U-shaped glacial valley of the Cle Elum River. Damming the natural lake in 1933 changed the visual setting of the valley. Cle Elum Reservoir is larger than the natural lake and water levels fluctuate throughout the year as the reservoir is drawn down to meet downstream irrigation demands. The reservoir is generally full in late spring and early summer, but is drawn down starting in late spring. It does not refill until the following spring. The fluctuating water levels leave large areas of exposed shoreline from late summer through the winter. In dry years, the reservoir may not completely fill, exposing the upper portions of the reservoir year-round.

The visual setting for Cle Elum Reservoir provides a perceived "natural" landscape with limited development along the shores. Viewers of the reservoir are primarily recreationists and seasonal residents. Middle ground views are of forested hillsides with some logged patches, valley walls, ridges, and mountains beyond (see Photos 3-1 and 3-2). Pine and Douglas-fir trees dominate the vegetation. The landscape character is predominantly a naturally appearing to slightly altered forested environment viewed in the foreground, middle ground, and background of the Cle Elum Reservoir viewshed.

The upper Cle Elum River flows through the valley bottom into the north end of the reservoir (see Photo 3-3). The river creates a delta area that is often exposed when water levels are low. Public views across the reservoir are generally unrestricted from the southwest shoreline and more restricted from the southeast shoreline. Because the reservoir is over 7 miles long, there are no public views of the full length of the reservoir.

Cle Elum Dam, located on the south end of the reservoir, is approximately 165 feet tall and 1,800 feet in length with a gated spillway. The full height of the dam and the spillway are visible only from the downstream side of the dam. Public views of the downstream side of the dam are limited by steep topography and restricted access. From the reservoir and shoreline, public views of the dam are mostly unrestricted, but only a few feet of the dam are visible above the water level (see Photo 3-5).

Most viewers of the reservoir are located along the east shore, and to a lesser extent on the north shore, where vehicle access is available to the shoreline and to developed areas. Development adjacent to the reservoir is generally limited to USFS facilities, including roads on the east and northwest shore, boat launches, campgrounds, and seasonal cabins (see Photos 3-2 to 3-10). Year-round residences and resorts are located south of the reservoir near the dam and are visible from the main road. Numerous residential areas are located along the east side of the reservoir, but are generally not visible from the road. Most of the west shore is inaccessible and undeveloped. Dispersed recreation and camping are very popular in areas outside of developed recreational facilities (see Photo 3-8), especially in the Dry Creek, Morgan Creek, and French Cabin Creek areas along the north shore of the reservoir, and in less formal areas along the Cle Elum River. In these areas, the landscape remains predominately natural appearing, but there is evidence of informal roads, trails, and other signs of human use that may detract from the setting.

3.10.2 USFS Visual Criteria

The USFS manages the land around the reservoir principally as a scenic viewshed according to its 1990 Wenatchee National Forest Plan (USFS, 1990). The Wenatchee National Forest Plan has designated scenic quality objectives and recreation setting objectives for the Cle Elum Reservoir area. These designations include Scenic Travel 1, Scenic Travel 2, Recreational River Proposed, and Developed Recreation.

The USFS management direction for scenic viewsheds containing dams and reservoirs is described in terms of visual quality objectives (VQOs). The VQOs are based on large-scale visual inventory and a management process called the "Visual Management System" (VMS), which has been used by the USFS since the 1970s (USFS, 1974). The VQOs describe the degree of acceptable alteration of the undisturbed landscape. Higher-level VQOs, such as “Preservation,” protect the most highly visible and most frequently seen areas that have the greatest amount and variety of natural features and vegetation.

In 1995, the USFS adopted a new method of visual management, called the "Scenery Management System" (USFS, 1995). This method introduces the concept of scenic integrity as a measure of the degree to which people visually perceive a landscape as complete. Scenic integrity levels (SILs) corresponds to VQOs, thereby integrating scenic values and landscape aesthetics in forest plans. The USFS established scenic integrity for each management area ranging from very high, meaning the landscape is unaltered, to low, meaning moderate alterations are apparent on the landscape. Table 3-9 describes the relationship between VQOs and SIL:

Table 3-9. Relationship between Visual Quality Objectives and Scenic Integrity

VQO–SIL	Condition	Perception, Degree of Deviation
Preservation–very high	Unaltered	The valued landscape character is intact with only minute deviations, if any.
Retention–high	Appears unaltered	Alterations to landscape not evident. Deviations may be present but must repeat form, line, color, and texture of characteristic landscape in scale.
Partial retention–moderate	Slightly altered	Landscape appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.
Modification–low	Moderately altered	Landscape appears moderately altered. Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings.
Maximum modification–very low	Heavily altered	Landscape appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings.
Unacceptably low (not a management objective, used for inventory only)	Unacceptable modification	Deviations are extremely dominant and borrow little, if any, form, line, color, texture, pattern, or scale from the landscape character.

Note: VQO and SIL descriptions presented as allocated for Cle Elum Reservoir.
Source: USFS, 1995, 2-4.

The USFS allocates the Cle Elum Reservoir foreground viewshed to the following scenic quality objectives and corresponding VQOs and scenic integrity:

- **Scenic Travel 1** – Retention VQO–High. The goal is to retain or enhance the viewing and recreation experiences along scenic travel routes.
- **Scenic Travel 2** – Partial Retention VQO–Moderate. The goal is to provide a near-natural appearing foreground and middle ground along scenic travel corridors.
- **Recreational River Proposed** – Retention VQO–High. The goal is to preserve the recreational river characteristics of the river and surrounding area, pending a decision on its legislation as part of the Wild and Scenic Rivers System.
- **Developed Recreation** – Retention VQO–High. The goal is to provide developed recreation in an urban to semi-primitive recreation opportunity spectrum setting.

The USFS determined that Cle Elum Reservoir meets the established VQO of "Retention" as viewed from Cle Elum Reservoir, State Route 903 (known locally as Salmon La Sac Road), Forest Road 4330 (FR-4330; known locally as Cle Elum Valley Road), and developed recreation sites. In areas designated a "Retention" VQO, a visitor would perceive all foreground landscapes as natural and the landscape would have high SIL. All other foreground viewsheds meet the established VQO of "Partial Retention." In these areas, a visitor would perceive a natural to slightly altered landscape viewed in foreground and middle ground areas, and the SIL would be classified as moderate.

3.11 Air Quality

3.11.1 Air Quality Standards and Regulations

This section describes the air quality conditions of the Cle Elum Reservoir area and the applicable air quality regulations. The impact analysis area for air quality is the area around the reservoir and downwind locations potentially affected by increased emissions or fugitive dust expected during the construction phase of the Proposed Action.

Ambient air quality is assessed by comparing concentrations of air pollutants to regulatory standards. The EPA regulates air quality under the Federal Clean Air Act (CAA). In Washington State, Ecology and the local Clean Air Agency, where applicable, administer the CAA. As there is no local Clean Air Agency for Kittitas County, administration of air quality regulations resides with Ecology.

Under authority of the CAA, the EPA has established nationwide air quality standards, known as the National Ambient Air Quality Standards (NAAQS). These standards represent the maximum allowable atmospheric concentration of criteria pollutants. Pollutants for which standards have been set include carbon monoxide (CO), nitrogen dioxide (NO_2), suspended particulate matter less than 10 or 2.5 microns in aerodynamic diameter (PM_{10} and $PM_{2.5}$), ozone (O_3), sulfur dioxide (SO_2), and lead (Pb). The State of Washington has also adopted ambient air quality standards for these pollutants. Table 3-10 lists the current Federal and State NAAQS and violation criteria for each pollutant.

If the ambient air in a specified region meets the NAAQS, it is an attainment area. Conversely, if a region does not meet the NAAQS, it is a nonattainment area. Ecology makes determinations for attainment and nonattainment by analyzing air monitoring data. If an area does not have adequate air monitoring data to make a determination, it is designated unclassified and treated as an attainment area. All areas of Kittitas County (where the Cle Elum Reservoir is located) are designated as attainment or unclassified for all criteria pollutants (Ecology, 2014b), and Kittitas County is in attainment for all criteria pollutants.

Table 3-10. National and State Ambient Air Quality Standards

Criteria Pollutant	Averaging Period	NAAQS		Violation Criteria	
		Washington	National	Washington	National
CO	1-hour	35 ppm	35 ppm	If exceeded more than once per year	If exceeded more than once per year
	8-hour	9 ppm	9 ppm		
NO_2	1-hour	100 ppb	100 ppb	If exceeded by the mean of annual 98th percentile of daily max values over 3 years	If exceeded by the mean of annual 98th percentile of daily max values over 3 years
	Annual	53 ppb	53 ppb	If exceeded	If exceeded
PM_{10}	24-hour	150 μg/m^3	150 μg/m^3	Not to be exceeded more than once per year averaged over 3 years	For 1997 nonattainment areas, if exceeded on more than 1 day per year. For other areas, if exceeded by the mean of annual 99th percentile values over 3 years
$PM_{2.5}$	24-hour	35 μg/m^3	35 μg/m^3	If exceeded by the mean of annual 98th percentile values over 3 years	If exceeded by the mean of annual 98th percentile values over 3 years
	Annual	μg/m^3	μg/m^3	If exceeded	If exceeded as a 3-year spatial average of data from designated stations
O_3	8-hour 12	0.075 ppm 12	0.075 ppm	If exceeded by the mean of annual 4th highest daily values for a 3-year period	If exceeded by the mean of annual 4th highest daily values for a 3-year period
SO_2	1-hour	75 ppb	0.075 ppm	If exceeded by the 99th percentile of 1-hour daily max concentrations over 3 years	If exceeded by the mean of annual 99th percentile of daily max values over 3 years
	3-hour	0.5 ppm	0.5 ppm	If exceeded on more than 1 day per year	If exceeded on more than 1 day per year
	24-hour	0.14 ppm	---	If exceeded more than once per year	--
	Annual	0.02 ppm	---	If exceeded	--
Lead (Pb)	Rolling 3 month	0.15 μg/m^3	μg/m^3	If exceeded	If exceeded

Sources: 40 CFR Parts 50, 53, and 58; EPA 2011; National Ambient Air Quality Standards (NAAQS); Ecology 2014a. Ambient Air Quality Standards in Washington State 0.15

Each State is also responsible for protecting air quality by developing a state implementation plan (SIP) to maintain or improve air quality. In their SIPs, States are required to address the EPA prevention of significant deterioration (PSD) requirement. Under the PSD provisions, incremental increases of specific pollutant concentrations are limited above a legally defined baseline level for new or modified major stationary sources in attainment or unclassified areas. SIPs must also address visibility within federally designated Class I areas, where good air quality is deemed to be of national importance (Section 162 CAA, August, 1977, defines Class I areas). The Class I area closest to Cle Elum Reservoir is the Alpine Lakes Wilderness Area, 3 miles north. Prevailing winds are generally from the west; therefore, air pollution from offshore (Pacific) and urban centers west of the Cascade Mountains contribute to visibility impairment. The State has not identified construction activities as contributing to visibility impairment in Class I areas in Washington (Ecology, 2010).

Ecology regulates construction activities as a source of air pollution under the jurisdiction of Ecology and local regulations. Projects that require earthwork or otherwise have the potential to create fugitive dust are required to use best management practices (BMPs) to control dust at the project site. According to WAC 173-400-300, fugitive air emissions are emissions that “do not and which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.” These emissions include fugitive dust from unpaved roads, construction sites, and tilled land. Fugitive emissions are considered in determining the air quality permits required only for a certain subset of sources, not including this type of proposed project. However, pursuant to WAC 173-400-040(8)(a), “The owner or operator of a source of fugitive dust shall take reasonable precautions to prevent fugitive dust from becoming airborne and shall maintain and operate the source to minimize emissions.”

3.11.2 Current Air Quality Environment

To measure existing air quality, Ecology maintains a network of monitoring stations throughout Washington State. Generally, these stations are placed where air quality problems may occur, usually in or near urban areas and close to specific air pollution sources. Other stations in remote areas provide an indication of regional air quality.

No existing air quality monitoring sites are located near Cle Elum Reservoir. The closest monitoring station is located in Ellensburg, 30 miles east. Reclamation did not use data from this station to estimate existing air quality in the analysis area because Ellensburg is in an urban and suburban area. The actual ambient air quality at Cle Elum Reservoir most likely is much better than that in Ellensburg because of the lower population density and lack of significant emission sources.

Given the sparse population and rural nature of most of Kittitas County, existing sources of air pollution are minimal. The primary source of existing air pollutants in the project area is vehicle emissions. The nearest major freeway, I-90, is located 3.5 miles southwest of the reservoir area. SR-903 on the east side of the reservoir is the nearest major paved road adjacent to the reservoir. Fugitive dust and combustion emissions are generated in the area by vehicles traveling on gravel or dirt roads, construction, and other activities that disturb the soil and utilize combustion engines.

Wood fires from cabins and campfires generate carbon monoxide, formaldehyde, nitrogen oxides, and particulates. Forest fires also generate air pollution. Since prevailing winds are generally from the west, air pollution from urban centers west of the Cascade Mountains can enter the Cle Elum River valley during certain weather conditions.

3.12 Climate Change

Global climate change has the potential to impact water resources in the Cle Elum watershed and the Yakima River basin. Scientists predict that increasing atmospheric CO_2 concentrations will produce significant changes in atmospheric circulation, resulting in higher global air temperature and altered average precipitation patterns. The area of impact analysis for climate change is the Yakima River basin and the Cle Elum River basin.

The Cle Elum Pool Raise Project has the potential to alter how Reclamation manages water resources under climate change. The Integrated Plan PEIS evaluated potential effects on the Yakima River basin associated with climate change at a programmatic level (Sections 3.13 and 3.14 in Reclamation and Ecology, 2012). For this FEIS, Reclamation and Ecology conducted project-level hydrologic modeling studies of potential changes associated with climate change. The results of these studies, presented in the 2014 Hydrologic Modeling Report (Reclamation and Ecology, 2014b), are discussed below and in Section 4.12 of this FEIS.

3.12.1 Climate Change Predictions for the Yakima River Basin

The water source in the Yakima River basin is a mix of direct runoff from rain and snowmelt. Wetter and colder winters tend to accumulate more snowpack in the highest elevations of the watersheds above the five existing Yakima basin storage reservoirs. Colder springs tend to retain accumulated snowpack longer, producing snowmelt runoff within the irrigation season. Warmer and drier winters and springs tend to generate less snowpack and to produce snowmelt runoff before the start of the irrigation season. Snowmelt runoff during the irrigation season allows Reclamation to preserve water stored in the reservoirs, leaving them fuller and better able to meet late-season irrigation demand.

Simulations of future conditions in Washington indicate that the Yakima basin would be more affected by climate change than other types of watershed (Mantua et al., 2010). Given the low altitude of the watershed areas above the Yakima basin reservoirs, a relatively small increase in winter and spring temperature could cause winter precipitation to fall as rain rather than snow, and could initiate earlier melting of the snowpack. Recent climate change studies to assess risks to water supply in the Yakima River basin include those conducted by the Climate Impacts Group (CIG) at the University of Washington. The study results are included in Addendum A to the *Yakima River Basin Study, Volume 1, Proposed Integrated Water Resource Management Plan* (Reclamation and Ecology, 2011a).

Climate change effects under two scenarios were modeled for this FEIS, using the Yakima Project RiverWare model. A description of the RiverWare model is provided in Section 2.4.1.2 of this FEIS and Section 5.3 of the Integrated Plan PEIS (Reclamation and Ecology, 2012). The "Baseline" scenario uses historical hydrologic conditions developed from empirical stream gage data from 1926 to 2006. It does not include the projects and action described in the No Action Alternative in Section 2.3.1. The “Adverse” scenario assumes future greenhouse gas emissions, temperature changes, and precipitation changes that are in the central part of the range of available climate change scenarios (RMJOC, 2010). The selected “Adverse” scenario reflects climate change conditions that may occur during the 2040s (Reclamation and Ecology, 2011d). “B1” emissions pathways were assumed as the basis for this scenario[2]. Table 3-11 summarizes the climate change scenarios.

Table 3-11. Summary of Climate Change Scenarios

Scenario	Climate Model Used	Descriptive Label	Average Temperature Change	Average Precipitation Change	Average Annual Inflow to Five Reservoirs (1,000 Acre-Feet)
Baseline	None	Baseline	0	0	1,660
Adverse	HADCM (B1 emissions pathway)	2040s central change	1.7ºC (35.1ºF) average increase	3.7% increase	1,480

Source: Reclamation and Ecology, 2011d (p. 42).
HADCM = general circulation model used (*Hadley Centre Coupled Model*)

The following sections present changes to water supply under the selected climate change scenario.

3.12.1.1 Changes in Snowpack

Snowpack is the so-called “sixth reservoir” in the Yakima River basin because runoff that comes from melting snowpack meets most demands in the spring and early summer. Only about 30 percent of the average annual total natural runoff above the Parker stream gage can be stored in the current Yakima River basin reservoirs (Reclamation and Ecology, 2011f). Therefore, the water supply of the Yakima River basin is susceptible to changes in snowpack caused by climate change.

Increased air temperatures from climate change would cause more precipitation in the Cascade Mountains to fall as rain rather than snow, which would reduce snowpack in the headwaters of the Cle Elum River. Higher air temperatures would cause snowpack to melt earlier than under current conditions (Reclamation and Ecology, 2011a). Studies have shown that the Yakima River basin is likely to have a 12 percent decrease in snowmelt volume given a 1ºC (1.8ºF) rise in air temperature, and a 27 percent decrease in snowmelt volume given a 2ºC (3.6ºF) rise (Vano et al., 2010).

[2] The B1 scenarios assume that the world is more integrated and more ecologically friendly than other emissions pathways. The scenarios include rapid economic growth and rapid change toward a service and information economy. Global population is assumed to rise to 9 billion in 2050 and then to decline. Other assumptions include reductions in material intensity and the introduction of clean and resource-efficient technologies, with an emphasis on global solutions to economic, social, and environmental issues (Intergovernmental Panel on Climate Change, SRES SPM (2000), "Summary for Policymakers," Emissions Scenarios: A Special Report of IPCC Working Group III).

3.12.1.2 Changes in Quantity and Timing of Runoff

To analyze changes in runoff volume and timing caused by climate change, the model compared the predicted total inflow into Cle Elum Reservoir under the Baseline and Adverse climate change scenarios. The average volume of runoff in acre-feet expected to enter Cle Elum Reservoir under Baseline and Adverse (HADCM model) conditions each month is shown in Figure 3-10 by month and tabulated by season in Table 3-12.

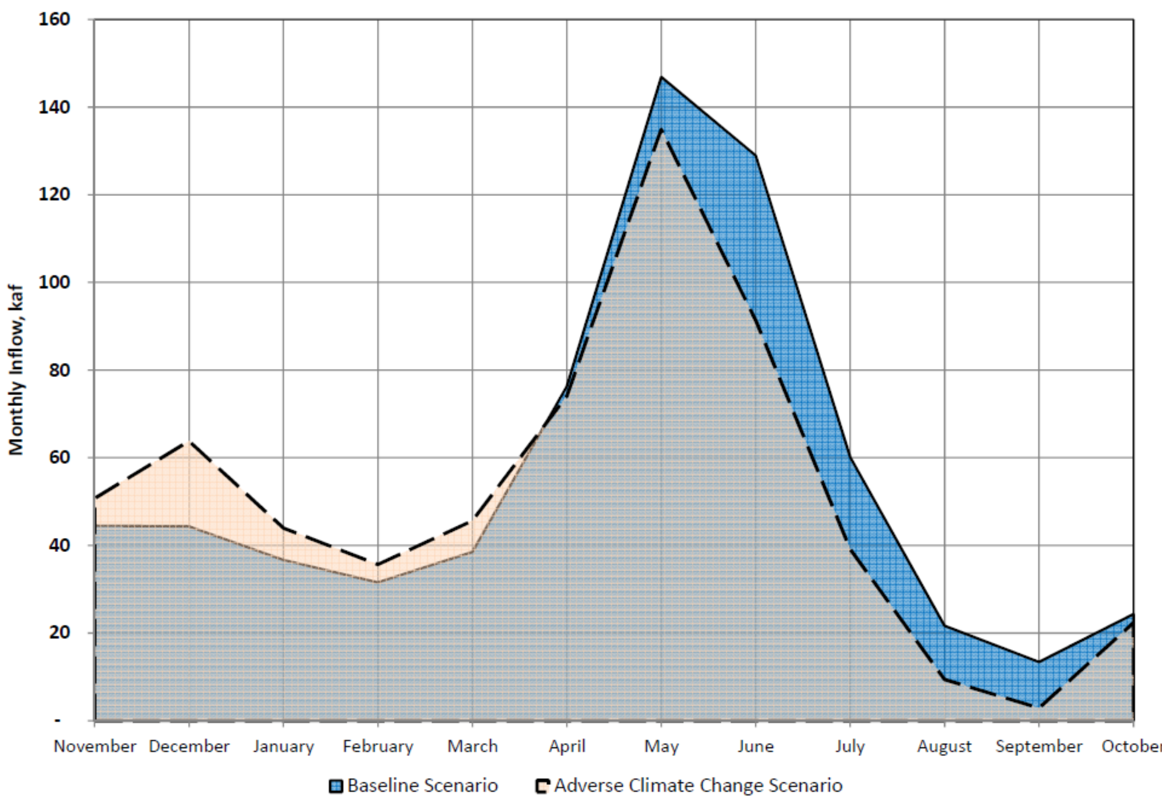

Figure 3-10. Average Monthly Reservoir Inflows under Baseline and Adverse Scenarios
(Source: Reclamation and Ecology, 2014b)

Table 3-12. Average Seasonal Inflows into Cle Elum Reservoir for the Climate Change Scenarios

Scenario	Seasonal Inflow (1,000 acre-feet)				
	Fall (Oct-Dec)	Winter (Jan-Mar)	Spring (Apr-Jun)	Summer (Jul-Sep)	Total
Baseline	125	151	334	60	669
Adverse (HADCM B1)	158 (+27%)	160 (+5%)	260 (-22%)	35 (-41%)	613 (-8%)

Based on the model results, Reclamation expects substantial changes in runoff in the Cle Elum River basin from climate change. For the scenario modeled as part of the Yakima River Basin Study (Reclamation and Ecology, 2011e), the average annual change in reservoir inflow decreases by 8 percent compared to the existing or historically based (i.e., Baseline) scenario. This 8 percent decrease integrates the anticipated 22 percent decrease in spring runoff and 41 percent decrease in summer with increases in fall (5 percent) and winter (27 percent).

The modeled shifts in runoff quantity and timing would cause substantial risks to water supply. Fall and winter inflow would increase, but not necessarily to a degree that would allow full refill of the reservoir before spring. The model predicts higher agricultural demand under Adverse than under Baseline conditions in the low inflow period of the summer, when the modeled decrease in spring and summer inflow would cause faster depletion of stored water. The combined effects would likely cause a decrease in overall supply during the high-demand period. Average Cle Elum Reservoir water surface elevations under the Baseline and Adverse climate scenarios are shown in Figure 3-11. On average, the existing reservoir would be 16 feet lower under the Adverse climate change scenario. Figure 3-12 shows simulated Cle Elum Reservoir water surface elevations for the modeled years from October 1, 1997 to September 30, 2002. This series of years is representative of drought (2001), wet (1999), and normal (1998, 2000, 2002) runoff conditions under Baseline conditions. The same series of years are used in descriptions of surface water resources in Section 3.2 and analyses of impacts in Section 4.2 for Surface Water Resources and 4.12 for Climate Change. Figure 3-12 illustrates the more variable water level predicted for the reservoir and the greater annual drawdown predicted. The lowest reservoir level may be reduced by 10 to 70 feet with climate change.

In addition to lower simulated water surface elevations, results of the Adverse climate change scenario show that the existing Cle Elum Reservoir would fill less frequently. This effect may mean that the enlarged storage capacity provided by the Cle Elum Pool Raise Project would be needed less often than under historical hydrologic conditions. On the other hand, the Adverse climate change scenario would increase both water demand and the need for additional storage; the additional storage would be used to meet water supply needs as well as minimum instream flow targets during summer, when runoff would be lower than under Baseline conditions.

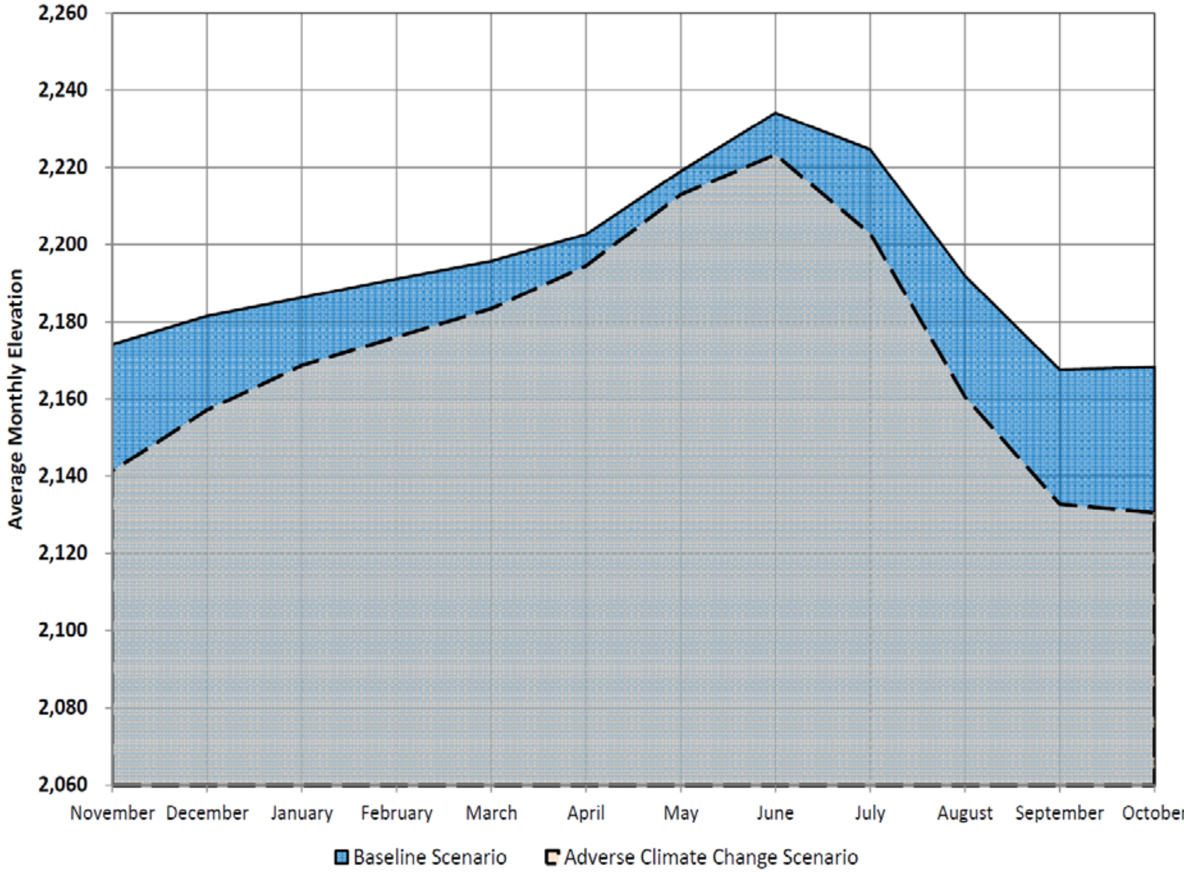

Figure 3-11. Average Monthly Cle Elum Reservoir Water Surface Elevations under Baseline and Adverse Scenarios

(Source: Reclamation and Ecology, 2014b)

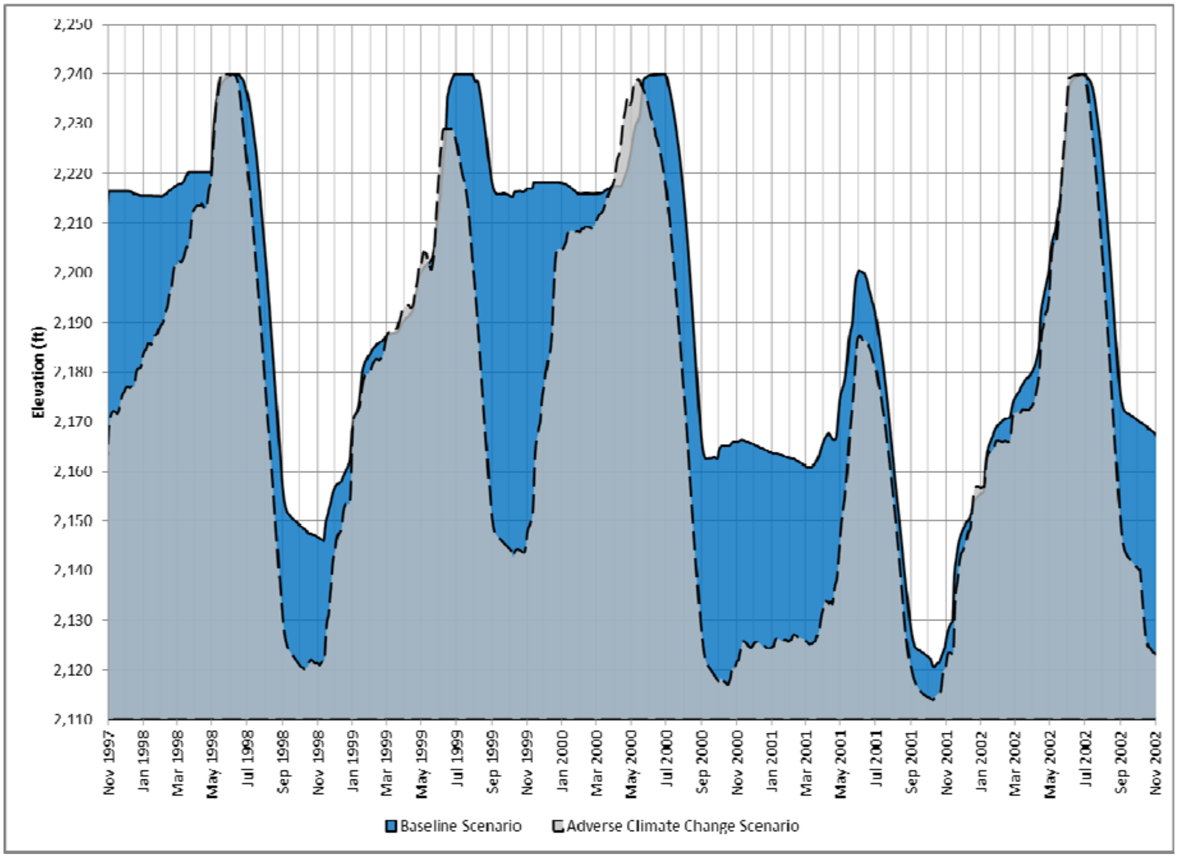

Figure 3-12. Cle Elum Reservoir Water Surface Elevations for Selected Period of Record (1997-2002) Baseline compared to Baseline with Climate Change

3.13 Noise and Vibration

This section describes the existing noise conditions at Cle Elum Reservoir, expected noise and vibration levels from likely construction equipment for the project, and regulations related to noise and vibration. The area of impact analysis is the locations around the reservoir potentially affected by increased noise, especially those areas with sensitive receptors (Section 3.13.2).

There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. A decibel (dB) is the unit used to describe the amplitude of sound. Noise levels are stated in terms of decibels on the A-weighted scale (dBA). This scale reflects the response of the human ear by filtering out some of the noise in the low- and high-frequency ranges that the ear does not detect well. The A-weighted scale is used in most noise ordinances and standards.

Noise effects in humans can be physical or behavioral. The mechanism by which chronic exposure to elevated sound levels leads to hearing damage is well-established. Elevated sound levels cause trauma to the cochlear structure in the inner ear, which leads to irreversible hearing loss. Hearing loss can begin to occur with prolonged exposure at 85 dB. For context, normal conversation is approximately 60 dB, and the noise from heavy city traffic can reach 85 dB. Motorcycles, firecrackers, and small firearms all emit sounds from 120 to 150 dB (NIDCD, 2008). Noise pollution can also be annoying and distracting.

Vibrations due to construction activities can be annoying or disturbing to humans and damaging to nearby structures. Peak particle velocity (PPV) is the measurement of vibration. The PPV is the maximum velocity experienced by any point in a structure during a vibration event. It is an indication of the magnitude of energy transmitted through vibration. PPV is an indicator often used in determining potential damage to buildings from stress associated with blasting and other construction activities.

3.13.1 Noise Standards and Regulations

State, county, and local noise regulations specify standards that restrict both the level and duration of noise measured at any given point. The maximum permissible environmental noise levels depend on the land use of the property generating the noise and the land use of the property receiving the noise.

Cle Elum Reservoir and Dam are located in Kittitas County, which has no noise regulations; therefore, the Washington State regulations apply to the project. WAC 173-60 establishes limits on the levels and duration of noise crossing property boundaries. These levels are based on the environmental designation for noise abatement (EDNA), which is defined as an area or zone (environment) within which maximum permissible noise levels are established. There are three EDNA designations (WAC 173-60-030), which generally correspond to residential, commercial and recreational, and industrial and agricultural uses:

- Class A: Land where people reside and sleep (such as residential)
- Class B: Land requiring protection against noise interference with speech (such as commercial and recreational)
- Class C: Land where economic activities are of such a nature that higher noise levels result (such as industrial and agricultural)

Table 3-13 summarizes the maximum permissible levels applicable to noise received at the three EDNAs. Noise-sensitive areas in the project vicinity include Class A and Class C EDNA.

Table 3-13. Maximum Allowable Noise Levels

Environmental Designation for Noise Abatement of Noise Source	Maximum Allowable Noise at Receiving Property (dBA)		
	Class A	Class B	Class C
Class A (residential/recreational)	55	57	60
Class B (commercial)	57	60	65
Class C (industrial)	60	65	70

WAC 173-60-050 identifies noise sources or activities that are exempt from the noise limits described in the Table 3-13:

- Sounds created by traffic on public roads
- Sounds created by warning devices (i.e., backup alarms)
- Sounds from blasting and from construction equipment, which are exempt from the standards during the day (7 a.m. to 10 p.m. weekdays and from 9 a.m. to 10 p.m. on weekends) in rural and residential districts

No State, regional, or local regulations relate to vibration. The potential effects from vibration on people and buildings are evaluated using U.S. Department of Transportation guidelines for vibration levels from construction (FTA, 2006).

Construction equipment can cause ground-borne vibration, also measured in a decibel notation (VdB). Unlike noise, vibration is not a phenomenon that most people experience every day. The threshold for human perception of ground-borne vibration is around 65 VdB. However, human response to vibration is not usually significant unless the vibration exceeds 70 VdB. The level of background vibration velocity in residential areas is typically 50 VdB or lower. Heavy construction equipment, such as large bulldozers and loaded trucks, can generate between 85 and 87 VdB at 25 feet. Vibration levels greater than 100 VdB can potentially cause minor damage to fragile historic buildings.

3.13.2 Noise Setting

Cle Elum Reservoir is located in a relatively remote forested area that is sparsely populated and is considered a Class A area. Sensitive noise receptors at Cle Elum Reservoir include several parcels of private land with houses or cabins located below (southeast) and across (northeast) the reservoir from the dam and along the east shore of the reservoir and upper Cle Elum River. Some of these receptors are close to the project area and proposed construction zones. Recreational boaters, fishers, campers, hunters, and skiers frequent the project area.

Typical background noise levels in coniferous recreational settings during the daytime range from 35 to 45 dBA in summer and 30 to 35 dBA in winter (USFS, 2007). Current sound levels at Cle Elum Reservoir are not uncharacteristic for the type of land uses found there, as vegetation and winter snowpack absorb human-caused noise. However, at the shore or on the reservoir surface, the absence of features to absorb or bar sounds allows noises to amplify and travel farther. Major noise sources include traffic on local roads and recreational uses of the reservoir, including motor boating and jet skis. Noise levels are lower in the winter, when recreational uses and traffic levels on Salmon La Sac Road have declined.

3.14 Recreation

This section describes the existing recreational facilities and activities in the Cle Elum Reservoir area. Recreation is one of several purposes that the Yakima Project, including the Cle Elum Reservoir, is intended to serve so long as operation of the Yakima Project to provide water for irrigation purposes and existing contracts are not impaired (Yavapai-

Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434)). The area of impact analysis for recreation is the Cle Elum Reservoir, the Cle Elum River above and below the reservoir, the shorelines, and the adjacent upland areas where recreation resources and activities could be affected by the project. The majority of recreation use in the affected area is water-oriented. Water-oriented recreation includes both water-dependent recreational activities, such as boating and fishing, as well as activities such as camping and picnicking that do not depend on water access, but are enhanced by proximity to the waterbody.

Water-oriented recreation opportunities are largely found along the east shore of Cle Elum Reservoir where vehicle access is available, and both downstream and upstream of the reservoir along the Cle Elum River and its tributaries. Primary seasonal, water-oriented recreational activities include camping, picnicking, fishing for cold-water species, motorized boating, kayaking and canoeing, whitewater rafting, and swimming. Upland activities such as hiking, hunting, and wildlife viewing also are popular pursuits. The USFS prohibits recreational riding of off-highway vehicles on the reservoir bed, but occasional illegal use still occurs as mudflats develop and extended reservoir shorelines become accessible with draw down of the reservoir pool. The USFS vehicle closure order makes specific exceptions at limited managed areas such as Speelyi Beach, where motorized vehicles are allowed ingress directly to the shoreline, parking, and egress only.

The Cle Elum River provides regionally acclaimed whitewater rafting upstream of the reservoir. The rapids are rated by the American Whitewater Association as Class IV-V from Scatter Creek to Salmon La Sac Creek (China Gorge), and as Class II from Salmon La Sac Creek to Cle Elum Reservoir and from Cle Elum Dam to the river’s confluence with the Yakima River. Rafters use the NF-4308 bridge upstream of the reservoir as a take-out point (American Whitewater, 2014). In the spring, whitewater kayakers also use this stretch of the Cle Elum River for recreational events.

In the winter, recreational activities include cross-country skiing, snowshoeing, and snowmobiling. The road systems and backcountry areas surrounding Cle Elum Reservoir are nationally recognized for the groomed snowmobile routes, challenging terrain, and scenic quality. Sno-parks in the area include French Cabin (25 spaces) and Salmon La Sac (100 spaces) in addition to the Last Resort staging area (75 spaces). These facilities provide the jumping off point to more than 100 miles of groomed snowmobile routes as well as parking for the Salmon La Sac non-motorized winter recreation area with its network of groomed ski and skate trails.

Public recreation areas supporting activities such as camping and boating are managed primarily by the USFS out of its Cle Elum Ranger District. Nearby developed campgrounds along the reservoir and the upper Cle Elum River include Wish Poosh and Cle Elum River campgrounds (see Figure 3-13). Salmon La Sac Campground is located approximately 3.5 miles north of the reservoir. Other USFS facilities at the reservoir include the Speelyi Beach Boat Launch and Day Use Area and the Wish Poosh Boat Launch and Day Use Area (see Photos 3-6 and 3-7). The WDFW manages the Bell Memorial Boat Launch. Table 3-14 includes information about the amenities and use at these developed recreation sites.

Dispersed recreation and camping are very popular in areas outside of developed recreational facilities (see Photo 3-8), especially in the Dry Creek, Morgan Creek, and French Cabin Creek areas near the northern edge of the reservoir, and in less formal areas along the Cle Elum River. Dispersed day use activities and camping using both tents and recreational vehicles is common, particularly during the summer when developed campsites are full and lower water levels in Cle Elum Reservoir increase access to shorelines. Dispersed recreation use continues into the fall after the USFS developed campgrounds close, and increases again during the hunting season. The USFS has documented over 100 large, dispersed camping spots on and around the reservoir. Many of these areas may accommodate groups of 10 to 20 persons or more.

The Wish Poosh and Cle Elum River campgrounds serve about 25,000 to 30,000 visitors each summer season. These campgrounds and other day-use recreational facilities sometimes exceed capacity on summer weekends and typically on holiday weekends. In addition, many residents of Kittitas County and other recreationists in the area who are not using USFS overnight campgrounds at the reservoir nonetheless make Cle Elum Reservoir a favorite day-use destination to pursue water-oriented activities during the warmer months.

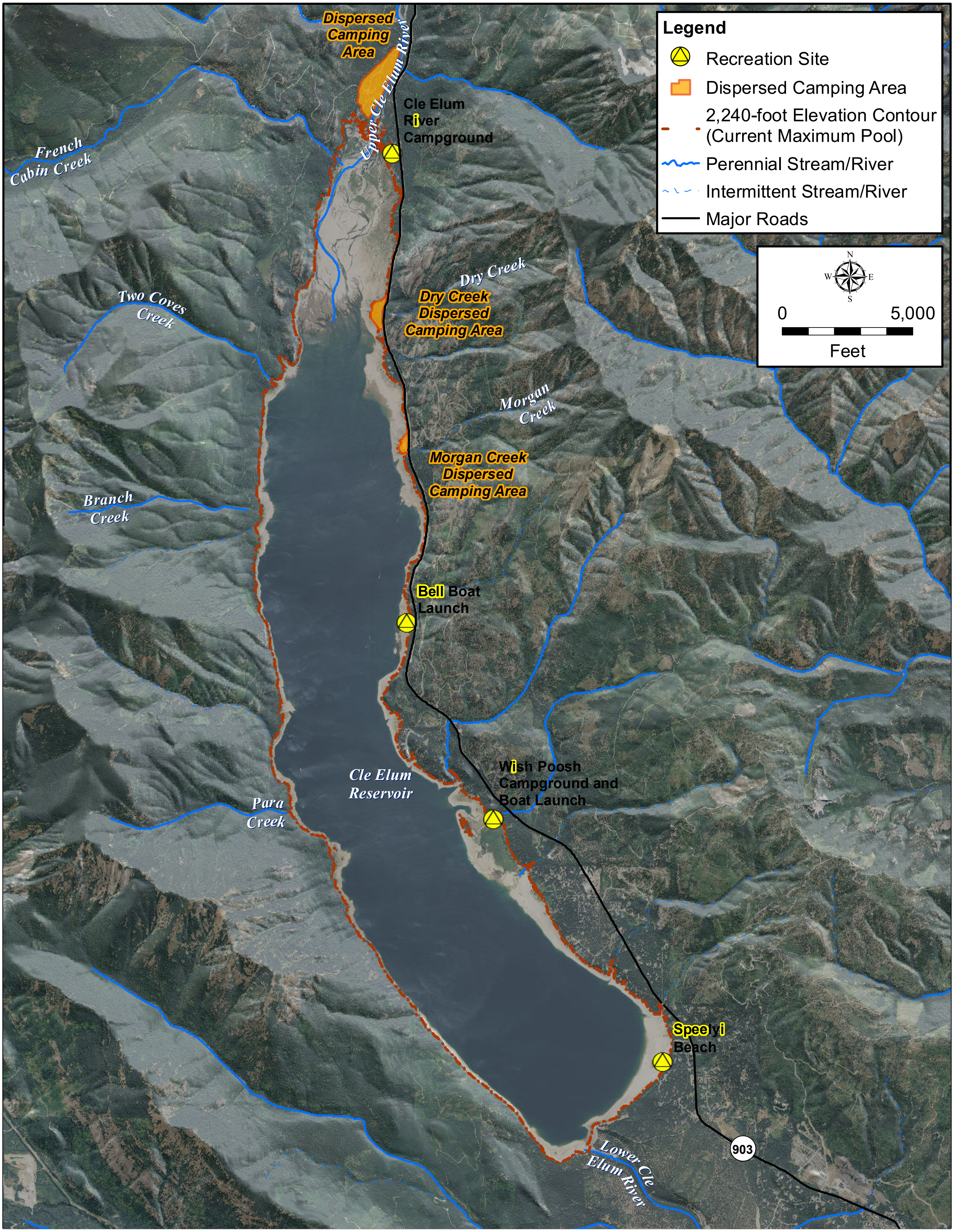

Figure 3-13. Recreation Sites along Cle Elum Reservoir and River

Table 3-14. Recreation Sites on Cle Elum Reservoir and Cle Elum River

Site	Facilities	Use
Wish Poosh Campground, Day Use Area, and Boat Launch	• 29 single campsites and 5 double campsites, each with a table, fire ring, and parking spur • 3 flush toilet buildings • Paved roads • Potable water supplied to water hydrants from a well, generator, pump, and storage tank • Day use area with 6 tables, 4 water hydrants, and 1 large double-unit wood toilet building with flush toilets • Three-lane concrete boat launch (only paved public boat launch on the lake) • Day use site island known as Picnic Island with a single-unit cement vault toilet, 4 tables, ¼ mile of primitive trail, and 3 pedestal grills	• Campground typically open from the Thursday before Memorial Day through late September • Approximately 6,000 campers each summer • Boat launch typically open from mid-May until the reservoir level is too low • Boat launch receives approximately 850 vehicle visits per summer, depending on the length of the season • Picnic Island available by gravel road when the reservoir is drawn down
Cle Elum River Campground	• 8 single campsites and 6 double campsites, each with a table, fire ring/grill stove, and parking spur • Cle Elum River Group site, with a capacity of 100 people, 7 tables, 9 fire rings, 3 benches, 1 wood vault toilet, and 1 cement vault toilet • 2 cement vault toilets • Gravel roads • Direct access to the lake to launch canoes and kayaks • Potable water supplied by hand pump from a well	• Typically open from the Thursday before Memorial Day through early September • Approximately 4,500 campers each summer
Bell Memorial Boat Launch	• 1 toilet • Primitive boat launch	--
Speelyi Beach Boat Launch and Day Use Area	• Free day use site • 1 cement vault toilet • Driving access to the shoreline	• Open year-round --

3.15 Land and Shoreline Use

Cle Elum Reservoir is located within the Okanogan-Wenatchee National Forest. While there is private ownership of properties on the east side of the reservoir, the majority of the adjacent land to the west, north, south, and immediately along the reservoir shoreline is federally owned (Figure 3-14). The USFS administers Federal land pursuant to specific authorities granted by Congress to the Secretary of Agriculture and pursuant to the public land laws. The area for impact analysis for land and shoreline use is the land directly adjacent to Cle Elum Reservoir, particularly public and private land that the Cle Elum Pool

Raise Project would inundate, the sites of shoreline protection measures, and the sites of construction activities.

Reclamation operates Cle Elum Reservoir under authorization from Congress. This authorization allows Reclamation to operate the reservoir and reservoir levels as needed to meet the needs of the Yakima Project. In addition to the reservoir itself, Reclamation manages the Cle Elum Reclamation Zone, an area of land withdrawn from the National Forest on the south end of the reservoir and encompassing the dam facilities.

Cle Elum Reservoir is located within a largely forested area. The east side of the reservoir has several developed recreational areas, as described in Section 3.14. The DNR owns and manages a section of land on the east side of the reservoir. The east side of the reservoir also has numerous areas of private ownership with residential development. Portions of these private properties are located within the inundation area of the Cle Elum Pool Raise Project. The west side of the reservoir is relatively undeveloped and remains forested.

The communities of Ronald, Roslyn, and Cle Elum are located to the south and various residential and commercial developments are located to the east and south of the reservoir. Suncadia, a major resort development, is located on a 7,400-acre site along the lower Cle Elum River approximately 3.5 miles southwest of Cle Elum Dam.

3.15.1 Federal Plans and Policies

Management of Cle Elum Reservoir and the surrounding land is guided by a number of Federal, State, and local plans and policies. Because Cle Elum Reservoir is located within the Okanogan-Wenatchee National Forest, Reclamation and the USFS share jurisdiction for much of the affected Federal land and resources. Reclamation is exercising its primary authority as delegated by Congress to implement the Cle Elum Pool Raise. Therefore, Reclamation will adhere to the laws and regulations that govern its own actions in implementing the proposal.

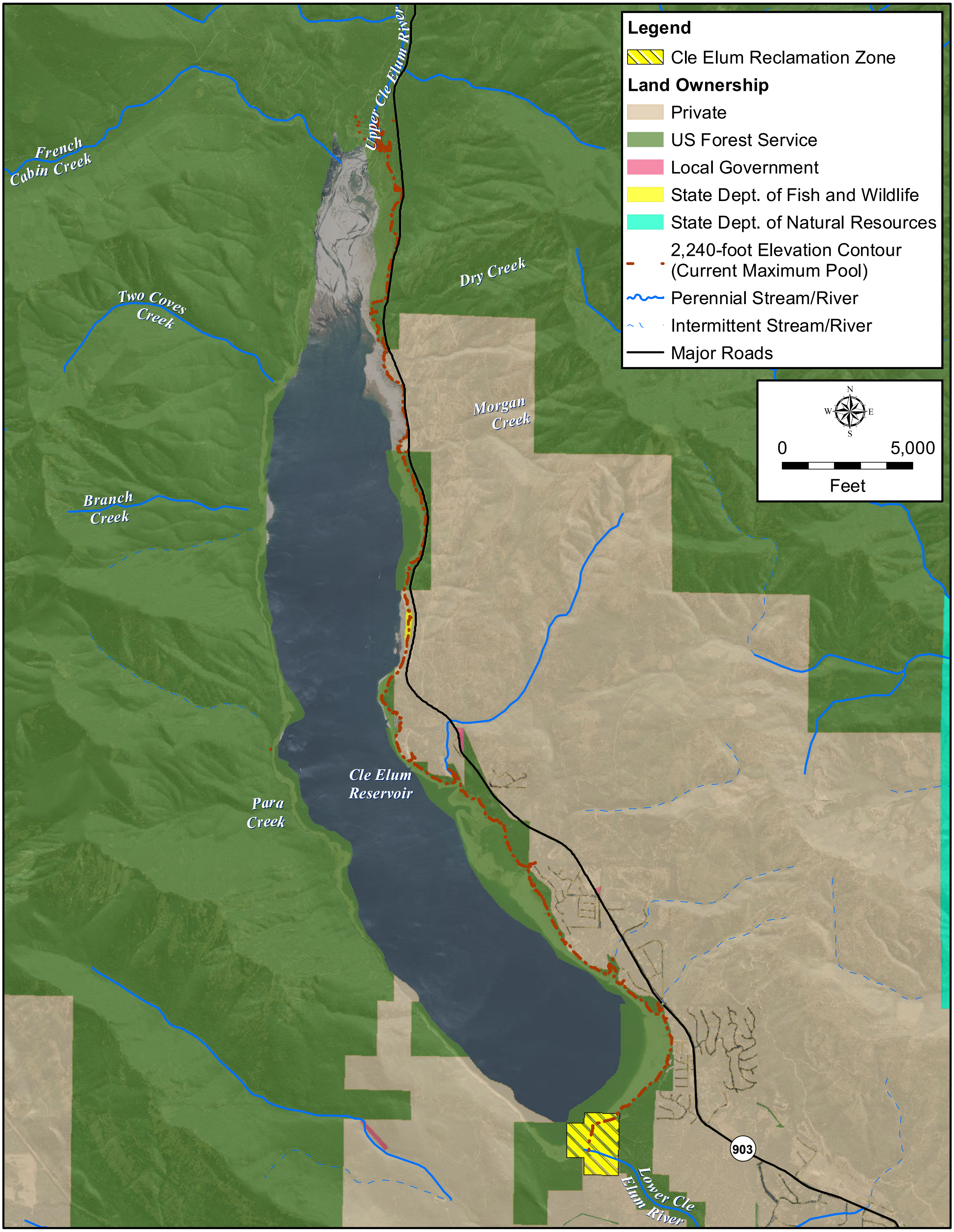

Figure 3-14. Land Ownership in the Project Area

3.15.1.1 1987 Master Interagency Agreement with the Forest Service

Reclamation and the USFS cooperatively manage land in the Yakima Project under the 1987 Master Interagency Agreement (Master Agreement) between the two agencies, which provides guidance at a national level. The Master Agreement covers all Federal land nationwide within the National Forest System Lands and Reclamation Project Lands in the West. The Master Agreement establishes procedures for planning, developing, operating, and maintaining Reclamation water projects within or affecting land within the National Forest System, including facilitating coordination and cooperation with the USFS regarding areas of mutual interest, responsibility, or both. In addition, a Project Supplemental Agreement for Cle Elum Reservoir guides local interaction between the agencies.

The two agencies executed project supplemental agreements for the Yakima Project reservoirs. These local agreements identify Federal land that will be under the primary administration of Reclamation, referred to as the "Reclamation Zone." Reclamation retains control for construction, operation, maintenance, and protection of the project as identified in the Master Agreement and the project supplemental agreement. Pursuant to the Yakima River Basin Water Enhancement Project legislation (Public Law 96-162) and the Reclamation Act of June 17, 1902, Reclamation has authority to perform feasibility study activities within the Yakima Project.

3.15.1.2 Northwest Forest Plan

The USFS and BLM adopted the Northwest Forest Plan in 1994, in response to the ESA listing of the northern spotted owl. The *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USFS and BLM, 1994a) and *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (USFS and BLM, 1994b) include the policies of the Northwest Forest Plan. The plan designates a number of conservation measures and allocates land (including the formal Riparian Reserves discussed below) designed to comprise a comprehensive ecosystem management strategy for forest areas throughout the Northwest.

3.15.1.3 Wenatchee National Forest Plan

The USFS adopted the Wenatchee National Forest Plan in 1990 (USFS, 1990). The plan set management goals, objectives, and standards and guidelines for management of the forest. Currently, the USFS is developing an updated Okanogan-Wenatchee National Forest Plan and released the *Proposed Action for Forest Plan Revision, Okanogan-Wenatchee National Forest* in June 2011 (USFS, 2011a)[3]. The USFS will prepare an EIS on the proposed Forest Plan revision. The proposed action for forest plan revision includes recommendations for

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[3] The USFS administratively combined the Okanogan and Wenatchee National Forests in 2000. The USFS changed the administrative name to Okanogan-Wenatchee National Forest in 2007.

establishment of new management areas, including Wilderness Areas and Wild and Scenic Rivers.

3.15.1.4 Riparian Reserves

The USFS maintains Riparian Reserves along the shoreline of Cle Elum Reservoir; along all streams, including the Cle Elum River; and around wetlands, seeps, and springs. The Riparian Reserve along the reservoir has a 150-foot buffer, and the Riparian Reserve along the Cle Elum River has a 300-foot buffer. The USFS requires that the Aquatic Conservation Strategy Objectives defined in the Northwest Forest Plan be met within the Riparian Reserves. Appendix E lists the nine Aquatic Conservation Strategy Objectives. Within Riparian Reserves where physical and biological processes are determined to be fully functional, the requirement is to maintain those functions. Within Riparian Reserves where those processes have been degraded, they must be restored (USFS and BLM, 1994b).

3.15.1.5 Wilderness Areas

The Wilderness Act (16 U.S.C. §§1131-1136) established the National Wilderness Preservation System. Wilderness areas preserve “areas where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain….” Each agency administering any wilderness area is responsible for preserving the area's wilderness character. Eight congressionally designated wilderness areas are present in the Okanogan-Wenatchee National Forest, including the Alpine Lakes Wilderness Area. The southwestern corner of the Alpine Lakes Wilderness Area, which is largely located in Chelan County with portions in Kittitas County, is approximately 3.5 miles north of the project area. The headwaters of the Cle Elum River are within the wilderness area.

3.15.1.6 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (16 U.S.C. §§ 1271-1287) establishes a National Wild and Scenic Rivers System for the protection of rivers that have important scenic, recreational, fish and wildlife, and other resources. The system protects the designated river and an adjacent corridor of land. The classifications of rivers are wild, scenic, and recreational. The act contains procedures and limitations for control of land by Federal agencies within the system.

There are currently no designated wild and scenic rivers near Cle Elum Reservoir. However, the Wenatchee National Forest Plan recommends designation of the Cle Elum and Waptus rivers (USFS, 1990). The Forest Plan recommends wild classification for the Waptus River. The plan recommends wild classification for the Cle Elum River within the Alpine Lakes Wilderness Area, scenic classification between the Wilderness Area and Tucquala Lake, and recreational classification from Lake Tucquala to Cle Elum Reservoir. The Forest Plan states: “Rivers and streams recommended for classification under the Wild and Scenic Rivers Act will be protected to retain their attributes at the highest possible classification.” The *Proposed Action for Forest Plan Revision, Okanogan-Wenatchee National Forest* recommends designation of the Cooper River, a tributary of the upper Cle Elum River

(USFS, 2011a). The USFS proposed Cooper River for designation as a Wild and Scenic River for its outstandingly remarkable values in scenery, recreation, and ecological values.

The Integrated Plan also recommends wild and scenic river designation for several rivers in the Yakima River basin, including the upper Cle Elum, Waptus, and Cooper rivers. The upper Cle Elum River recommendation presented in the Integrated Plan excludes the area of the Cle Elum River that would be inundated by the Cle Elum Pool Raise project.

3.15.1.7 Snoqualmie Pass Adaptive Management Area

Cle Elum Reservoir is located within the Snoqualmie Pass Adaptive Management Area (SPAMA), established under the Northwest Forest Plan. The SPAMA includes 212,700 acres of National Forest land. The USFS established management goals for the SPAMA in 1997 in the *Snoqualmie Pass Adaptive Management Area Plan Final Environmental Impact Statement* (WSDOT, 2008). Within the SPAMA, the USFS focuses on ecosystem management, primarily restoration of late-successional forests and connection of wildlife habitat. The USFS is actively decommissioning roads within the SPAMA and allows timber harvest only where it benefits restoration (WSDOT, 2008).

3.15.1.8 Mountains to Sound Greenway

Land around Cle Elum Reservoir is part of the Mountains to Sound Greenway Scenic Byway, designated as a Washington State Scenic Byway. This designation is based on the route’s outstanding scenic character and environmental experiences. The Mountains to Sound Greenway runs from Ellensburg to Seattle. The greenway is managed by the Mountains to Sound Greenway Trust in accordance with the *Mountains to Sound Greenway Implementation Plan* developed by WSDOT (WSDOT, 1998).

3.15.2 Local Land Use Planning

Kittitas County land use and zoning requirements apply to private and State-owned properties, primarily located to the east of the reservoir (Figure 3-15). Land along the eastern shore of the reservoir site is zoned “forest and range” and “rural recreation” (Kittitas County Board of County Commissioners Ordinance No. 2013-001). The forest and range zone is intended “to provide for areas of Kittitas County wherein natural resource management is the highest priority and where subdivision and development of land for uses and activities incompatible with resource management are discouraged.” The rural recreation zone is intended “to provide areas where residential development may occur on a low density basis or in residential clusters” with a primary goal to “promote rural recreation residential development associated with the many natural amenities found within Kittitas County” (Kittitas County Code Title 17).

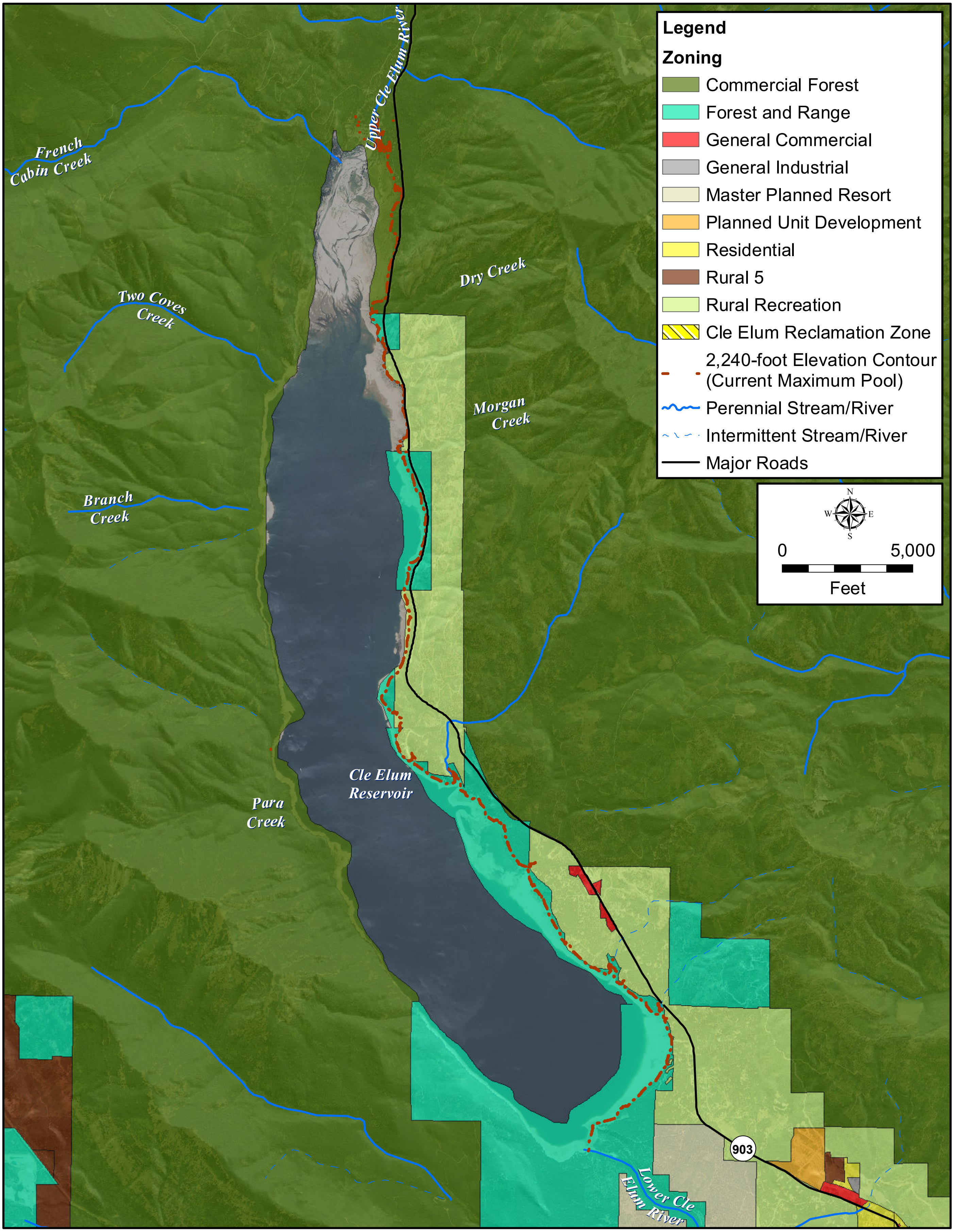

Figure 3-15. Zoning around Cle Elum Reservoir

Much of the land surrounding the reservoir to the west, east (beyond the immediate shoreline), and north is zoned Commercial Forest. The Commercial Forest zone is intended to "provide for areas of Kittitas County wherein natural resource management is the highest priority and where the subdivision and development of lands for uses and activities incompatible with resource management are discouraged consistent with the commercial forest classification policies of the comprehensive plan."

Other Kittitas County regulations, including the Critical Areas Ordinance (CAO) and Shoreline Master Program (SMP), described below, apply to private land around the reservoir. These regulations do not apply to Federal land.

3.15.2.1 Critical Areas

Land under the jurisdiction of Kittitas County is subject to the Kittitas County CAO adopted in 1994 (Kittitas County Code Title 17A). The county is updating the CAO and expects adoption of the updated Ordinance in 2015. The CAO establishes buffers around wetlands and riparian habitat. It also regulates development in frequently flooded areas, geologically hazardous areas, big game winter range areas, and aquifer recharge areas.

3.15.2.2 Shoreline Management

Cle Elum Reservoir is a Lake of Statewide Significance (lakes over 1,000 acres in area) under the State Shoreline Management Act (SMA). The Cle Elum River from the National Forest boundary downstream to the confluence with the Yakima River is a Shoreline of the State. Under the Kittitas County SMP adopted in 1975, much of the shoreline of Cle Elum Reservoir and the Cle Elum River is within a Conservancy shoreline environment designation. The intent of this designation is to sustain natural resource development while maintaining the natural character of the shoreline area. Under the SMP, the county permits shoreline protection measures (called "shoreline works") in a Conservancy designation only where they "do not substantially change the character of that environment." Projects are not permitted "if the possibility [exists] that downstream properties and natural river systems will be adversely affected by any such development" (Kittitas County, 1975).

Kittitas County released a final draft of its updated SMP in January 2014. Under the draft SMP, the majority of Cle Elum Reservoir would be designated Rural Conservancy, with the portion of the southeastern side of the reservoir in private ownership designated Shoreline Residential. In both shoreline environment designations, the county would permit bioengineered shoreline stabilization measures. The county would designate all other shoreline stabilization measures as conditional uses. The county would allow structural stabilization measures when necessary to protect an existing primary structure, and requires geotechnical analysis to document that the structure is in danger from shoreline erosion (Kittitas County, 2014a).

3.16 Utilities

A number of utilities serve the Cle Elum Reservoir area. Section 3.5, Groundwater, describes the OSSs and water wells in the area. The area of impact analysis for utilities is the area around the reservoir served by electric or solid waste utilities.

Electric power within Kittitas County is provided by Kittitas County Public Utility District (PUD) and Puget Sound Energy. Puget Sound Energy delivers power to Cle Elum Dam with a 12.5-kilovolt (kV) line that is transformed to 240-volt, 3-phase power at the dam. There is also a 30-kilowatt (kW), 240-volt, 3-phase backup generator at the dam.

Power lines to residential and recreation areas around the reservoir are located parallel to Salmon La Sac Road. No power lines are located in the reservoir shoreline.

The project area lies within unincorporated Kittitas County and curbside solid waste collection is voluntary. Waste Management of Ellensburg provides collection under contract with Kittitas County (Kittitas County, 2011). Solid waste collection occurs along SR-903.

3.17 Transportation

This section describes the road system around Cle Elum Reservoir and access to the reservoir. The area of impact analysis includes the roads used to access the dam and reservoir area and roads near the reservoir used to access residential and recreational sites along the reservoir and upper Cle Elum River. The closest major highway to the Cle Elum Reservoir area is I-90. Regional and local access from I-90 to Cle Elum Reservoir and the upper Cle Elum River is via SR-903 (Salmon La Sac Road), a two-lane roadway extending northwest from the town of Cle Elum to NF-4330 (also known as Cle Elum Valley Road) (Figure 3-16). SR-903 is the only access road to residences and recreational facilities along the east side of Cle Elum Reservoir and NF-4330 provides the only access to the upper Cle Elum River.

The west side of Cle Elum Reservoir is generally inaccessible to vehicles; there are no roads. Access to the right abutment of the dam is provided by SR-903 and County Road 25010 (Lake Cle Elum Dam Road). Access to the left abutment of the dam is from SR-903 and Lake Cabins Road. NF-4303-000 crosses the Cle Elum River downstream of the dam and connects to NF-4303-201.

Snowmobile usage is high during the winter months in this area. A snowmobile trail (bladed shoulder) runs along SR-903 between White Fir Drive (14254 Salmon La Sac Road) and NF-4330. In addition, recreational snow parks are located off Salmon La Sac Road at NF-4305, in the southeast portion of the project area. Salmon La Sac Road is also open to, and meets State requirements for, wheeled all-terrain vehicles along the east side of Cle Elum Reservoir.

The Kittitas County long range transportation plan includes construction of a new bridge over the Cle Elum River downstream from the dam and a new road to access developments on the western side of the river (Kittitas County, 2008). The county currently has no funding for these projects and construction is not scheduled. There are no public works projects planned within the vicinity of the project area that fall under the *Kittitas County Department of Public Works Six Year Transportation Improvement Program* (Kittitas County, 2014b).

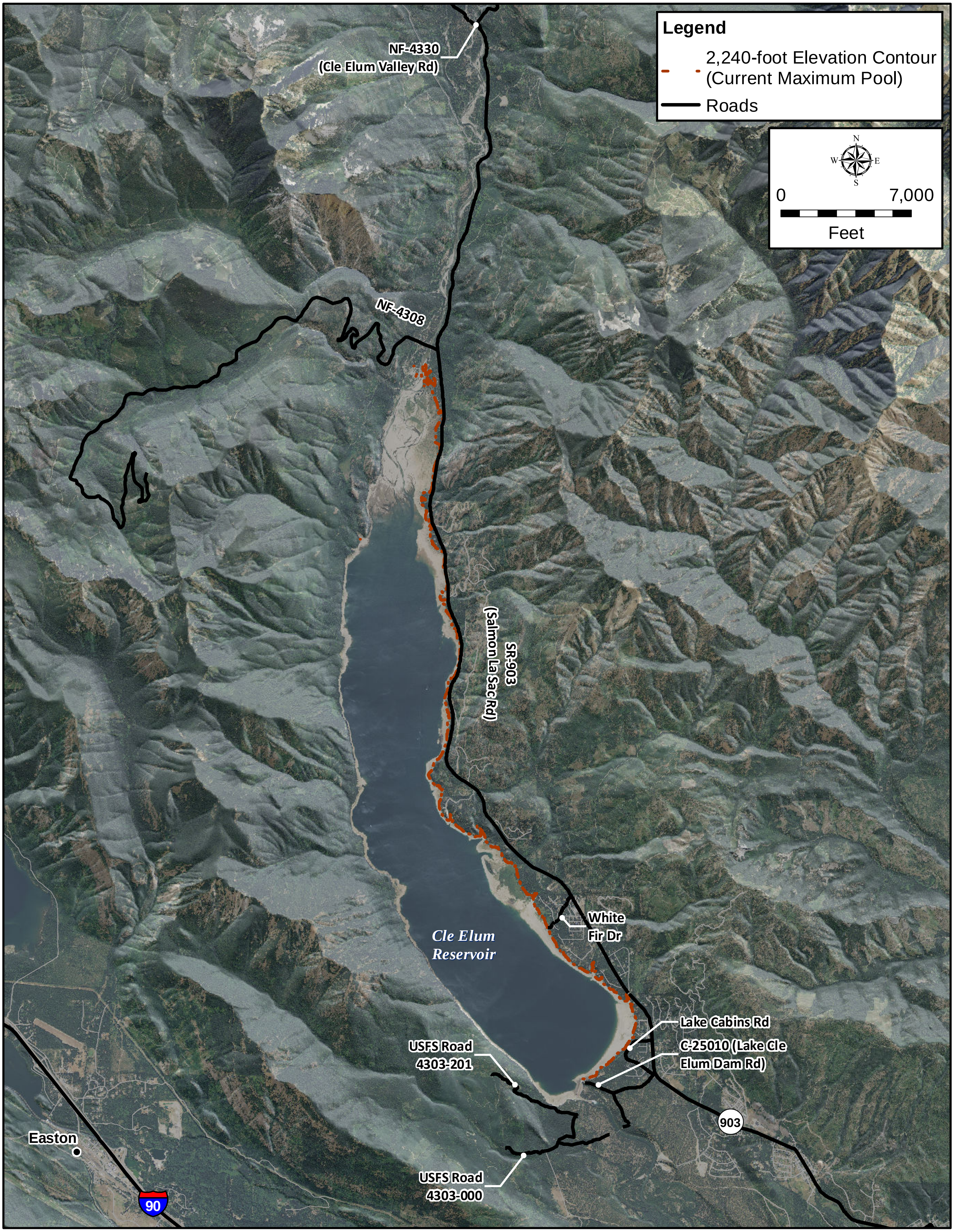

Figure 3-16. Transportation Facilities in the Project Area

3.17.1 Road Conditions

Most of the major transportation routes mentioned above are paved county roads, with the exception of NF-4330 and NF-4303, which are unpaved. In addition, various private roads are present on the east side of Cle Elum Reservoir, predominantly graveled in the southeast portion and paved in the northeast portion. During the winter, the county plows SR-903 up to Salmon La Sac Campground (WSDOT, 2004).

3.17.2 Traffic Data

Average daily traffic volumes based on actual traffic counts for I-90 and SR-903 are included in WSDOT's 2013 annual traffic report. Traffic volumes on I-90 at Cle Elum are 29,082 vehicles per day. For SR-903, from Cle Elum to the National Forest boundary, traffic volumes are 930 to 6,800 vehicles per day. The Kittitas County long-range transportation plan (2008) lists none of the project area roads or intersections as high accident locations, defined as corridors and intersections with three or more accidents during the 2004-2006 analysis period.

3.17.3 Roadway Standards

The Kittitas County provides standards for roadway design that must also meet WSDOT and American Association of State Highway and Transportation Officials (AASHTO) standards. Table 3-15 describes the major components of the county road design standards and access spacing requirements.

Table 3-15. Roadway Design Standards

Average Daily Traffic[1]	Functional Classification	Width (feet)		
		Lane	Shoulder	Total Pavement
0-399	Local	11	1	24
400-749	Local or collector	11	2	26
750+	Local or collector	11	3	28

[1]Vehicles per day

3.18 Socioeconomics

The impact analysis area for the socioeconomic analysis is the Yakima River basin region, encompassing Kittitas, Benton, Yakima, and Franklin counties (henceforth the "four-county study area"). Most of the economic impacts resulting from the Proposed Action concentrate in this four-county study area, which includes affected agricultural areas and the surrounding areas where the relevant markets related to agricultural operations are centered.

Key parameters of socioeconomic conditions used in this FEIS include commonly applied regional economic measures of industry output, personal income, and jobs (employment).

- Output is the broadest measure of economic activity and represents the value of production. Output includes intermediate goods plus the components of value added (including personal income), so the two measures (output and personal income) are not additive.

- Personal income consists of personal income and business income. Personal income represents wages and salaries, as well as other payroll benefits such as health and life insurance, retirement payments, and noncash compensation. Business income (also called proprietor's income) represents the payments received by small business owners or self-employed workers.
- Jobs are full- and part-time. In some instances, this analysis refers to "job years," which represents the equivalent of one full-time job for 1 year. Ten job years, for example, could refer to one job for 10 years, five jobs for 2 years, 10 jobs for 1 year, and so forth.

This analysis uses IMPLAN (Impact Analysis for PLANning) modeling software to examine the baseline conditions and economic impacts of the project. IMPLAN is an input-output (IO) model that works by tracing how spending associated with a specific project circulates through the defined impact area. Input-output models measure commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. This buying of goods and services (indirect purchases) continue until leakages from the region (imports and value added) stop the cycle. These indirect and induced effects can be derived mathematically by using a set of multipliers. The multipliers describe the change of output for each regional industry caused by a $1 change in final demand for any given industry.

Reclamation compiled IMPLAN data files from a variety of sources for the study area, including the U.S. Bureau of Economic Analysis, the U.S. Bureau of Labor, and the U.S. Census Bureau. Input-output models are static; they measure impacts based on economic conditions at any given point in time. The input-output models for this study were based on 2012 IMPLAN data, the most recent data available.

Table 3-16 displays the latest output, personal income, and jobs information as generated by the IMPLAN model based on 2012 data for the combined economy of the four-county study area, aggregated into eight major industry sectors. In 2012, the four-county study area generated $38.9 billion in output, $11.8 billion in personal income, and about 273,000 jobs. While the ranking of the five most important industry sectors within the economies of Kittitas, Benton, Yakima, and Franklin counties vary based on the regional economic measure considered, the following economic sectors consistently fall within the top five: service, manufacturing, agriculture, trade, and government. These sectors represented about 87 percent of the total employment within the four–county study area in 2012.

Table 3-16. Baseline Data for the Four-county Study Area – Output, Personal Income, and Jobs, 2012

Aggregate Industry Sector	Industry Output ($million)	Percent of Total	Personal Income ($million)	Percent of Total	Jobs	Percent of Total
Agriculture	$4,110	11	$1,012	9	33,312	12
Construction	$2,054	5	$621	5	13,114	5
Manufacturing	$6,959	18	$880	7	16,228	6
Trade	$3,996	10	$1,260	11	37,022	14
Service	$15,058	39	$4,842	41	111,257	41
Government	$3,573	9	$2,497	21	44,826	16
Other[1]	$3,179	8	$679	6	16,825	6
Total	$38,929	100	$11,790	100	272,584	100

[1] Other includes transportation, information, utilities, and mining
Source: 2012 IMPLAN Washington State Data. Benton, Franklin, Kittitas and Yakima Counties.

3.19 Cultural Resources

Cultural resources, the physical or other expressions of past human activity, are finite, nonrenewable, and often fragile. These resources encompass a broad range and can include specific places associated with traditional ceremonies, practices, artifacts, structures, archeological sites, objects, buildings, and landscapes associated with a period of time, a person, or historic movements. They also include Native American human remains and funerary offerings. Federal agencies are required to identify and evaluate the significance of cultural resources located within the area of potential effects (APE) of any Federal undertaking.

Reclamation is conducting cultural resources compliance for the Cle Elum Pool Raise Project concurrently with NEPA compliance. Reclamation, as lead federal agency, is complying in accordance with 36 CFR Part 800.8 of the Section 106 implementing regulations, entitled *Coordination with the National Environmental Policy Act*. Before Reclamation started work on the DEIS, it notified the Yakama Nation, Confederated Tribes of the Colville Reservation (Colville Confederated Tribes), State Historic Preservation Officer (SHPO), Advisory Council of Historic Preservation, and USFS of its intent to use the NEPA process for Section 106 purposes, as required by 36 CFR Part 800.8.

3.19.1 Cultural Resource Regulations

A number of Federal laws and regulations require Federal agencies to consider and protect cultural resources. In particular, the National Historic Preservation Act of 1966 (NHPA), as amended, and its implementing regulations for Section 106, set out the requirements and process to identify and evaluate historic resources, assess effects to these resources, and mitigate effects to significant resources that occur as a result of the agency's permitted undertaking. Under Section 110 of the NHPA, the responsibility of the Federal agency that owns or formally manages land includes identifying and managing the historic resources on that land, even when there is no new undertaking. Other Federal, State, or Tribal laws and policies that protect cultural resources include the Native American Graves Protection and Repatriation Act (NAGPRA), the American Indian Religious Freedom Act, and Executive Order 13007 Protection of Native American Sacred Sites.

For cultural resources, an effect occurs when the proposed project would disrupt or impact a prehistoric or historic archeological site or a property of historic interest or cultural significance to a community or ethnic or social group. These impacts are adverse if they would occur to cultural resource sites that are listed, or eligible for listing, on the National Register of Historic Places (NRHP). Other adverse impacts would include disturbance to graves and cultural items protected under NAGPRA and destruction of, or preventing access to, Indian sacred sites protected under Executive Order 13007. Examples of the types of impacts that could result from the Proposed Action (construction of radial gates or shoreline protection, reservoir operation, and higher reservoir levels) include the destruction, disturbance, disassociation, or alteration of a protected resource.

The State of Washington also regulates cultural resources through SEPA, which requires identification of cultural resources within a proposed project area. The State requires that agencies propose measures to reduce or control impacts on these resources. Under SEPA, the Washington Department of Archaeology and Historic Preservation (DAHP) provides formal opinions on the significance of sites and the impact of proposed projects on sites. Other State laws governing historic resources protect Native American graves (RCW 27.44), abandoned historic cemeteries (RCW 68.60), and archaeological sites (RCW 27.53). These laws contain clauses regarding the inadvertent discovery of cultural resources during activities such as construction. Washington State Governor’s Executive Order 05-05 requires State agencies to review capital projects with the DAHP and the affected Tribes; conduct appropriate surveys; and take reasonable actions to avoid, minimize, or mitigate adverse effects to historic properties. Because the Proposed Action is subject to Section 106 of the NHPA, Executive Order 05-05 does not apply.

3.19.2 Archaeological and Historical Overview

A historical overview of the project area is included in the *Cultural Resources Investigation of the Yakima Basin Integrated Plan: Keechelus Lake, Kachess Lake, Cle Elum Lake* and summarized below (Yakama Nation Cultural Resources Program, 2014).

Archaeological evidence of occupation of indigenous groups in the area of Cle Elum Reservoir dates to at least 12,000 years before present, based on the discovery of a Paleo-Indian Clovis point found at the southern extent of historic Cle Elum Lake. From 11,000 years before present and extending to 4,500 years before present, indigenous groups in the area had a predominantly mobile lifestyle. From 4,500 to 250 years before present, indigenous groups shifted toward a less mobile lifestyle. An increase in semi-subterranean dwellings and food storage occurred during this period.

The project area is within the territory of the Kittitas or upper Yakama Tribes. The Kittitas occupied the lowland Kittitas and Yakima valleys and the headwaters of the Yakima River. The project is also within the traditional territory of the Wenatchi, a constituent member of the Colville Confederated Tribes. The headwater area of the Cle Elum River was a particularly popular berry-picking, and summer home area. One winter village was located near glacial Cle Elum Lake, and a large summer encampment (*Tle'lam)* and fish traps were located at the southern end of the lake. There is documentation of several winter villages near Cle Elum Reservoir. Historic records also indicate Indian trails extended between historic Kachess and Cle Elum lakes and from Cle Elum Lake to the fisheries and berry-gathering areas on the upper Cle Elum River.

The first documented Euro-Americans in the area were fur traders of the Northwest Company in 1814. In 1853 and 1854, Territorial Governor Isaac Stevens sent George McClellan to find a route for a wagon road over what is now Snoqualmie Pass.

In 1855, the Tribes and Bands officially known today as the Confederated Tribes and Bands of the Yakama Nation (which include the Kittitas) signed the Treaty of 1855, ceding over 6 million acres to the U.S. Government. The treaty gave the Yakama Nation a reservation set aside for the sole use and benefit of the Yakama people. The Yakama Nation retained the exclusive rights to hunt, fish, and gather on the ceded land, which includes the Cle Elum Reservoir area.

Passage of the Homestead Act in 1862 and construction of a wagon road over Snoqualmie Pass in 1865 brought about an increase in Euro-American activity throughout the project area. Early interest focused on mineral resources, including coal, gold, and iron. In 1867, the Northern Pacific Railroad sent surveyors to the Snoqualmie Pass area to establish access routes across the Cascade Range. There was an increase in commercial interests in the project area, including coal mining and timber harvesting in the late 1800s and throughout the 1900s. In 1886, coal was discovered in the east Cascades. The coal mines, including those in the Roslyn and Ronald area, supplied the trains of the Northern Pacific Railroad.

Congress authorized Reclamation's Yakima Project in 1905, which led to construction of an extensive water storage and irrigation system, including Cle Elum Reservoir. The Union Gap Irrigation Company constructed the first crib dam at the southern end of glacial Cle Elum Lake. In 1907, Reclamation constructed a replacement crib dam, creating 26,000 acre-feet of storage. In 1933, Reclamation completed construction of the 165-foot-high dam, increasing the water storage capacity to 436,900 acre-feet.

3.19.3 Known and Reported Historic Resources

Section 4.16.2 of the *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project Final Environmental Impact Statement* (Fish Passage FEIS) (Reclamation and Ecology, 2011b) describes known and reported historic resources in the area of Cle Elum Dam. The Fish Passage EIS made particular note of a prehistoric Clovis-style projectile point as well as Cle Elum Dam. A recreationist discovered the projectile point in 1984, on a terrace along the reservoir, during a year of unusually low drawdown. During subsequent cultural resource investigations for the fish intake structure, additional cultural resource materials dating to the early prehistoric period were identified (Steinkraus, 2013), possibly indicating that the Clovis Point does not represent an isolated occurrence.

Cle Elum Dam was determined to be eligible for inclusion in the NRHP in 2011 (Houser, 2011). It is eligible under NRHP Criterion A for its association with Reclamation's Yakima

Project and early Depression Era Federal work projects. It was the last dam built in the Yakima Project's Storage Division. It assured the successful operation of the Roza and Kennewick irrigation divisions, which Reclamation could then build to complete the Yakima Project.

Cle Elum Dam is composed of three major features – embankment, outlet tunnel, and overflow spillway. A character-defining feature of the overflow spillway is the five 37-foot-by-17-foot radial gates, also known as "Tainter Gates," that were installed in 1935 and 1936. These gates increased the capacity of the reservoir from 356,000 acre-feet without spillway gates to 436,000 acre-feet with them (Doncaster, 2011).

Yakama Nation staff conducted a preliminary cultural resources survey in late 2013 in the area of reservoir shoreline that would be inundated by the Cle Elum Pool Raise Project. Conducted as part of the Section 106 report (Yakama Nation Cultural Resources Program, 2014), the survey included research from the DAHP database, which lists 49 previously recorded archaeological sites within 1 mile of the APE. The findings range from isolated historic trash (glass and tin cans) to a multicomponent site, having both historic and pre-contact elements, and an abandoned World War II-era amphibious vehicle.

According to the *Cultural Resources Investigation of the Yakima Basin Integrated Plan: Keechelus Lake, Kachess Lake, Cle Elum Lake* (Yakama Nation Cultural Resources Program, 2014), historic Cle Elum Lake has spiritual and ceremonial associations to the Yakama Nation. The Yakama Nation Cultural Resources Program suggests that the lake and associated precontact archaeological resources may qualify as Traditional Cultural Properties (TCPs). Further, the report cites the possibility of a direct link from precontact habitation and resource procurement sites at Cle Elum Reservoir to the occupation of the ethnographic village of *Tle'lam,* located near the mouth of the natural Cle Elum Lake.

The Cle Elum Pool Raise Project APE consists of approximately 300 acres along the perimeter of Cle Elum Reservoir that includes the areas subject to increased inundation, shoreline protection and protection for recreation facilities (Figure 3-17). Yakama Nation staff surveyed approximately 60 percent of the APE. Areas not surveyed at the time of this writing include proposed project features that were not identified at the time the survey was conducted, and areas that were inaccessible because of steep terrain, lack of road access, or lack of permission to enter private property. The Yakama Nation recorded seven sites and 11 isolates along the shoreline of Cle Elum Reservoir. Of the seven sites, one NRHP-eligible site (45FS1458) was recorded in the area of increased inundation.

3.20 Indian Sacred Sites

Executive Order 13007, Indian Sacred Sites (May 24, 1996), directs Federal agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites on Federal land. The Executive order further directs agencies to provide reasonable notice for proposed land actions or policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites. The Executive order defines a sacred site as a "specific, discrete, narrowly delineated location on Federal land that is identified by an Indian Tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion."

Sacred sites may include ceremonial areas and natural landmarks that are religious or symbolic representations. Sacred sites are typically identified during the Section 106 portion of the NHPA survey, or during Government-to-Government consultation. Further, staff from the Yakama Nation Cultural Resources Program prepared a draft cultural resources report for the project (Yakama Nation Cultural Resources Program, 2014). To date, no sacred sites have been identified in the project area.

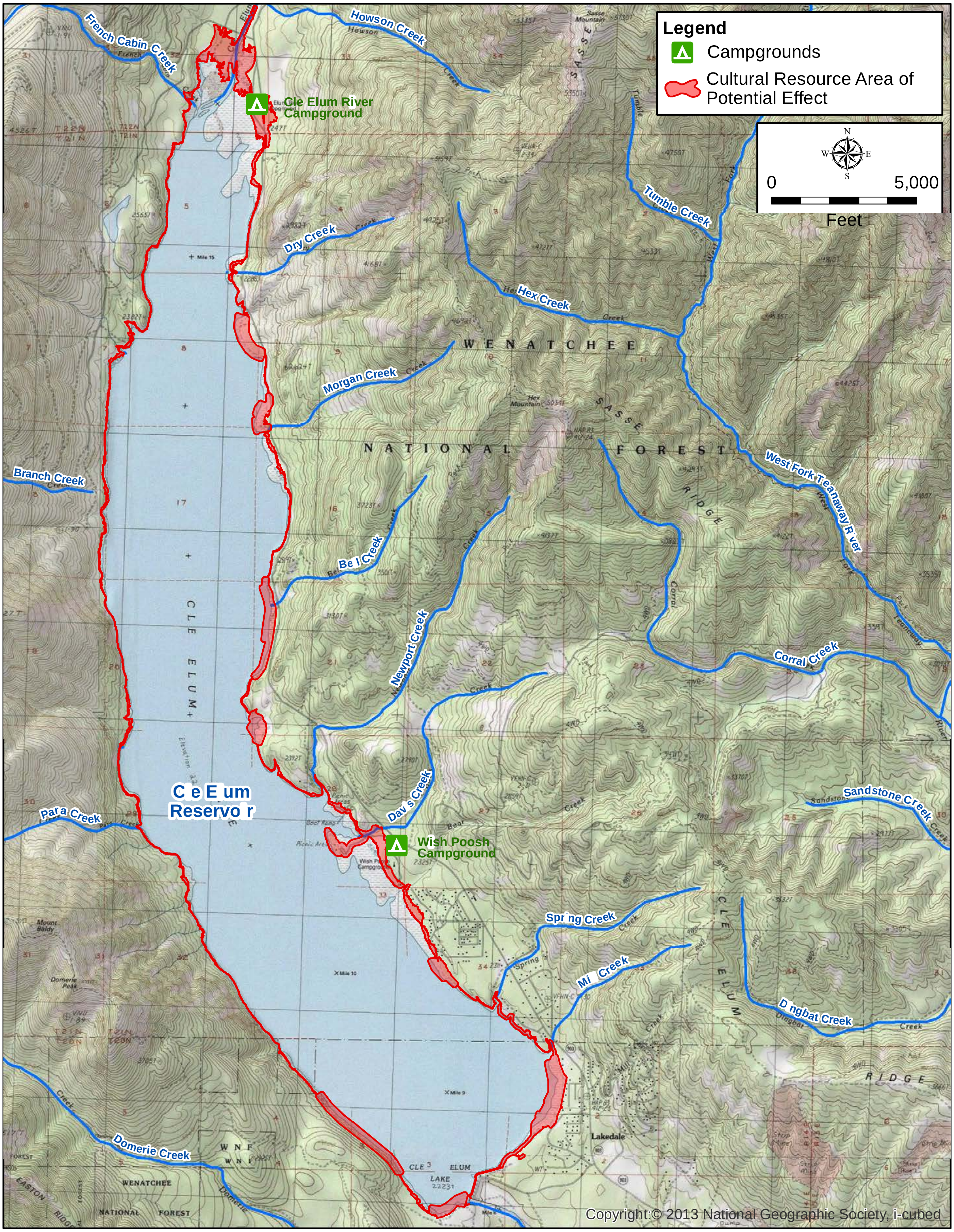

Figure 3-17. Cultural Resources APE

3.21 Indian Trust Assets

Indian trust assets (ITAs) are legal interests in property held in trust by the United States for federally recognized Indian Tribes or individual Indians. ITAs may include land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, and instream flows associated with trust land. The General Allotment Act of 1887 allotted land to some Tribes, while others were allotted land through treaty or specific legislation until 1934 when further allotments were prohibited. These allotments are ITAs.

Federally recognized Indian Tribes with trust land are beneficiaries of the Indian trust relationship. The U.S. acts as trustee. No one can sell, lease, or otherwise encumber ITAs without approval of the U.S. Government.

As stated in the 1994 Presidential Memorandum, *Government-to-Government Relations with Native American Tribal Governments*, Reclamation is responsible for the assessment of project effects on Tribal trust resources and federally recognized Tribal Governments. Reclamation is tasked to actively engage and consult federally recognized Tribal Governments on a Government-to-Government level when its actions affect ITAs (59 FR 22951, 1994).

The U.S. Department of the Interior Departmental (USDOI) Manual Part 512.2 delegates the responsibility for ensuring protection of ITAs to the heads of bureaus and offices (USDOI, 1995). The Department is required to "protect and preserve ITAs from loss, damage, unlawful alienation, waste, and depletion" (USDOI, 2000). Reclamation is responsible for determining if a proposed project has a potential to affect ITAs.

While the majority of ITAs are located on-reservation, ITAs can also occur outside reservation boundaries. Consequently, several Tribes have a historical presence or cultural interest in the project area. These include the Yakama Nation, the Colville Confederated Tribes, and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR).

The project area lies within land ceded in the Yakama Treaty of 1855. The treaty established the Yakama Reservation, which lies to the south of the project area, and reserved the following:

> *The exclusive right of taking fish in all the streams, where running through or bordering said reservation, is further secured to said confederated tribes and bands of Indians, as also the right of taking fish at all usual and accustomed places, in common with the citizens of the Territory, and of erecting temporary buildings for curing them: together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land*.

The Yakama Nation is a major partner in the development and implementation of the Integrated Plan. The Yakama Nation has been involved in all aspects of the Integrated Plan, including the Cle Elum Pool Raise Project.

Reclamation contacted the Bureau of Indian Affairs (BIA), Yakima Office, to identify the presence of ITAs or trust land (allotments) in the project area. BIA personnel indicated that there are no allotments in the Cle Elum Reservoir area. Reclamation also contacted personnel at the BIA Colville Tribal Office, who also indicated that there is no trust land in the project area (Wolf, 2014).

Reclamation has determined that the project area does not include land held in trust by the United States for Tribes or individual allottees, nor does the project area include trust land or allotments.

3.22 Environmental Justice

Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group should bear a disproportionate share of negative impacts. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, dated February 11, 1994, requires agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities, as well as the equity of the distribution of the benefits and risks. The impact analysis area for environmental justice is Kittitas County Census Tract 9751, which includes Cle Elum Reservoir and the entire project area.

Table 3-17 provides the numbers and percentages of population by racial category for this census tract, Yakima River basin counties, and the State of Washington. The information is based on the 2008 to 2012 U.S. Census American Community Survey, the most recent consistent source of information for the basin (U.S. Census Bureau, 2012). The data have likely changed since the survey was taken, but this information is a reliable indicator of population percentages.

Table 3-17. Race and Ethnicity

	Analysis Area Number (Percent)	Kittitas County Number (Percent)	Yakima County Number (Percent)	Benton County Number (Percent)	Washington Number (Percent)
Total population	5,733 (100)	40,954 (100)	242,454 (100)	175,424 (100)	6,738,714 (100)
One race	5,625 (98.1)	40,021 (97.7)	234,123 (96.6)	170,055 (96.9)	6,427,398 (95.4)
White	5,439 (94.9)	36,731 (89.7)	180,685 (74.5)	143,741 (81.9)	5,304,864 (78.7)
Black or African American	7 (0.1)	311 (0.8)	1,888 (0.8)	2,437 (1.4)	238,255 (3.5)
American Indian and Alaska Native	50 (0.9)	340 (0.8)	9,741 (4.0)	1,787 (1.0)	93,416 (1.4)
Asian	34 (0.6)	1,074 (2.6)	2,397 (1.0)	4,710 (2.7)	484,047 (7.2)
Native Hawaiian and Other Pacific Islander	2 (0.0)	2 (0.0)	145 (0.1)	206 (0.1)	39,246 (0.6)
Some other race	93 (1.6)	1,563 (3.8)	39,267 (16.2)	17,174 (9.8)	267,570 (4.0)
Two or more races	108 (1.9)	933 (2.3)	8,331 (3.4)	5,369 (3.1)	311,316 (4.6)
Racial minority	294 (5.1)	4,223 (10.3)	61,769 (25.5)	31,683 (18.1)	1,433,850 (21.3)
Hispanic or Latino (of any race)	204 (3.6)	3,164 (7.7)	108,920 (44.9)	32,471 (18.5)	754,366 (11.2)
Minority[1]	405 (7.1)	5,760 (14.1)	126,631 (52.2)	44,681 (25.5)	1,853,452 (27.5)

Source: US Census Bureau, 2012

[1] Population for the “Minority” category includes the U.S. Census categories “Nonwhite, not Hispanic or Latino” and “Hispanic or Latino.”

In comparison to the State of Washington and Kittitas County, the local project area has a smaller percentage of total racial minority and ethnic (Hispanic or Latino) populations. Additional potentially affected minority populations include members of the Yakama Nation and downstream Indian Tribes. While census data are available for recognized Indian reservations, specific data for Tribal members are not. Tribal members may be affected regardless of whether they reside on their reservations. Members of the Yakama Nation and other Tribes outside the immediate geographic area may currently use natural resources in the Yakima River basin and may do so in the future. Recreational users of the area could potentially include minority populations. The majority of recreationists visiting Cle Elum Reservoir are from the greater Seattle area or from the local area, but no information is available on their demographics.

Table 3-18 provides income, poverty, unemployment, and housing information for the same census tract. Low-income populations are identified by several socioeconomic characteristics. As categorized by the 2008 to 2012 U.S. Census American Community Survey, specific characteristics include income (median family and per capita), percentage of the population below poverty (families and individuals), unemployment rates, and substandard housing. Median family income and per capita income for the project census tract are greater than those for Kittitas County, but less than those for the State. The project area has a lower percentage of families and individuals below the poverty level than the State and county.

Table 3-18. Income, Poverty, Unemployment, and Housing

	Analysis Area	Kittitas County	Yakima County	Benton County	State of Washington
Income					
Median household income	$44,360	$41,739	$44,256	$60,300	$59,374
Per capita income	$27,971	$22,542	$19,610	$28,171	$30,661
Percent Below Poverty Level					
Families	7.4	11.0	17.2	9.4	8.7
Individuals	11.8	21.8	22.3	12.9	12.9
Percent unemployed	12.5	9.9	10.8	6.7	8.9
Percent of Housing					
1.01 or more occupants per room	0.9	2.4	7.0	2.5	2.7
Lacking complete plumbing facilities	0.6	0.3	1.0	0.1	0.5

Source: US Census Bureau, 2012

Other measures of low income, such as unemployment and substandard housing, characterize demographic data in relation to environmental justice. The unemployment rates for the study area are higher than those for the State and county. Substandard housing units are overcrowded and lack complete plumbing facilities. The percentage of housing units lacking complete plumbing facilities in the study area was greater than that in the State and county. The percentage of occupied housing units with 1.01 or more occupants per room in the study area was lower than the percentages for the county and State.

Chapter 4

ENVIRONMENTAL CONSEQUENCES

CHAPTER 4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter describes the anticipated beneficial and adverse impacts of the action alternatives on the environmental resources described in Chapter 3. The likely consequences of the No Action Alternative are also discussed. The chapter considers the impacts of short-term construction activities and the impacts that could occur over the longer term (operation and maintenance activities) for each resource. Actions and commitments intended to avoid or minimize environmental impacts are also described. The impact on the relevant resources is determined by comparing the impacts of the action alternatives to the No Action Alternative.

For each environmental resource, the impact analysis is presented according to the following outline:

- Methods and Impact Indicators. This section describes:
  - Impact Analysis Methods: Describes the technical or professional approach to analyzing impacts
  - Impact Indicators and Significance Criteria: A list of criteria used to determine whether changes to the environment are significant. The indicators and significance criteria are listed in tables. The significance criteria indicate the thresholds that determine whether or not an impact is significant. These thresholds indicate both negative and positive impacts. The impact indicators and significance criteria were refined between the DEIS and FEIS to provide increased clarity.
- Summary of Impacts. The key impact considerations and analysis findings for all alternatives are summarized following the Methods and Impact Indicators.
- Impact analysis for each alternative:
  - Alternative 1 – No Action
  - Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection
  - Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection
  - Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection
  - Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection

The following sections are included at the end of the chapter to meet SEPA and NEPA requirements:

- Section 4.23 Relationship of the Pool Raise Project to the Integrated Plan
- Section 4.24 Cumulative Impacts
- Section 4.25 Unavoidable Adverse Impacts
- Section 4.26 Relationship between Short-Term Uses and Long-Term Productivity
- Section 4.27 Irreversible and Irretrievable Commitments of Resources
- Section 4.28 Energy and Depletable Resources
- Section 4.29 Environmental Commitments

For NEPA purposes, the Council on Environmental Quality (CEQ) regulations define direct effects as effects "…which are caused by the action and occur at the same time and place" and indirect effects as effects "…which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8(a)-(b)). Indirect effects may include growth-inducing effects, changes in land use, changes in population density, or changes in growth rate and related effects on natural systems. SEPA defines environmental impacts as "effects on the elements of the environment" (WAC 197-11-752). SEPA does not separate direct and indirect impacts. This document combines the discussion of direct and indirect impacts.

CEQ regulations define a cumulative effect as "…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 actions" (40 CFR 1508.7). Section 4.24 discusses cumulative impacts for resources impacted by the project and for the Proposed Action as a whole.

4.2 Surface Water Resources

4.2.1 Methods and Impact Indicators

This section describes the impacts of the project on water storage in the reservoir and flows in the Cle Elum and Yakima rivers, which are the aspects of surface water resources most directly affected by the project. Section 4.4 describes surface water quality.

To evaluate how much additional shoreline would be inundated with the Cle Elum Pool Raise Project, Reclamation compared the area of inundation at 2,240 feet (existing maximum elevation) to that at 2,243 (proposed maximum elevation). Light Detection and Ranging (LiDAR) topographic data from 2000 (all but the east shoreline) and 2014 (the east shoreline) were used to map the inundation lines.

Reclamation used the RiverWare hydrologic model to evaluate potential effects on reservoir levels, releases, downstream flows, operations of the Yakima Project, and water supply. A description of the model appears in Section 2.4.1.2 and Section 5.3 of the Integrated Plan PEIS (Reclamation and Ecology, 2012). The RiverWare model simulates the operation of the Yakima Project and provides output on an average daily basis for reservoir levels in Cle Elum Reservoir and other Yakima Project reservoirs, streamflow in the Cle Elum River below Cle Elum Reservoir and other river reaches in the Yakima basin, and water deliveries to water users along the Yakima and Naches rivers. Hydrologic modeling was performed using a long period of record (1926 to 2009) to ensure adequate data would be available to characterize the performance of the project over a range of hydrologic conditions, including droughts. The river operations modeled include the existing Yakima Project operations and irrigation deliveries.

Table 4-1 summarizes impact indicators and significance criteria for surface water.

Table 4-1. Surface Water Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Higher reservoir level to aid fish passage	Increase in number of days when reservoir elevation is at 2,180 between April 1 and May 15
Change in instream flows in the Cle Elum and Yakima rivers	A measurable increase in Cle Elum River flow over current minimum levels of 220 cfs (180 cfs during years with low water supply) during winter would be a positive impact A measurable change in winter flows in the Yakima River would be a positive or negative impact A measurable increase in spring flows (March 15 to May 31) in the Cle Elum or Yakima rivers would be a positive impact A measurable decrease in spring flows (March 15 to May 31) in the Cle Elum or Yakima rivers would be a negative impact A measurable increase in summer flows in the Yakima River below Sunnyside Dam would be a positive impact
Increase in water supply in terms of deliveries to proratable water users	An increase in water deliveries to proratable water users of 0.8 percent (contributing to the Integrated Plan goal of 70 percent of prorationing in drought years)

4.2.2 Summary of Impacts

Under the No Action Alternative, no additional storage capacity would be available in Cle Elum Reservoir. Water supplies for proratable irrigators would continue to fall below 70 percent of entitlement during drought years. Instream flow conditions in the Cle Elum and Yakima rivers would not change, and fish survival and productivity in the Cle Elum River would remain relatively low. The reconstructed interim fish passage facility and the permanent fish passage facility would not impact water supply.

Under all action alternatives (Alternatives 2 through 5), the higher maximum pool level would inundate the same 46 additional acres of shoreline, increasing the total area of potential inundation to approximately 4,914 acres. The average number of days of additional inundation would be slightly lower under Alternatives 2 and 3 (39 days) than under Alternatives 4 and 5 (40 days). Similarly, the percent of years during which the reservoir would reach full pool would be slightly lower under Alternatives 2 and 3 (52 percent) than under Alternatives 4 and 5 (53 percent).

Under Alternatives 2 and 3, the additional storage would be used for either increasing the pool level for downstream outmigrants in spring or to improve instream flow in the Cle Elum and Yakima rivers during winter, spring or summer. The scenarios for use of the additional storage would have positive benefits on reservoir elevation and streamflow in the Cle Elum and Yakima rivers. Under Alternatives 4 and 5, the additional storage capacity would likely be used to increase total water supply available (TWSA) and thereby improve water supply during drought years. Under Alternatives 2 and 3, there would be no change to TWSA or deliveries to proratable water users. Under Alternatives 4 and 5, prorationing levels during drought years would rise by a maximum of 1.6 percent. In consultation with the Systems Operations Advisory Committee (SOAC), Reclamation would adaptively manage the use of water for all the alternatives.

4.2.3 Alternative 1 – No Action Alternative

Reclamation would continue to operate Cle Elum Reservoir as it currently does. No additional storage capacity would be available. Modeling results indicate that water supplies for proratable irrigators during drought years would remain below 70 percent of entitlement, which proratable irrigators have stated is the minimally acceptable level to prevent severe economic losses (Reclamation and Ecology, 2012, Section 1.3). If drought conditions continue at current levels or worsen because of climate change, water supplies for proratable irrigators could fall below 70 percent of entitlement more frequently. Completion of the Roza Irrigation District Reregulation Reservoir and the Enclosed Lateral Improvement Projects in the Sunnyside Division (Section 2.3.1.4) would annually conserve 8,484 acre-feet and 6,461 acre-feet, respectively. These conservation projects would help improve water reliability for proratable irrigators.

As described in Section 4.6.3, fish survival and productivity in the Cle Elum River would remain relatively low. Modeling for climate change impacts indicates that the No Action Alternative provides Reclamation with very limited flexibility to respond to increasingly dry years, and that the reservoir would take longer to refill during these periods.

Reconstruction of the interim juvenile fish passage facility and completion of the permanent fish passage facilities would improve conditions for fish. The fish passage facilities would not affect water supply. Fish passage operations would be integrated into existing project demands and would not impact existing water delivery contracts, TWSA, or flood control operations (Reclamation and Ecology, 2011b).

4.2.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.2.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Modification of the spillway gates on Cle Elum Dam would occur when the reservoir is drawn down near the end of the irrigation season in September or October. Reclamation would not be releasing water from the reservoir through the spillway gates during that time;

therefore, construction would not affect operation of the spillway gates or water storage and water releases from the dam.

Operation

Once completed, the radial gate modifications would increase reservoir storage by 14,600 acre-feet.

Increased Reservoir Pool

Operation

The water from the additional storage capacity would represent an increase of 3.3 percent over the existing 436,900 acre-feet of active storage capacity of Cle Elum Reservoir. The reservoir surface area would increase by approximately 46 acres to a total of approximately 4,914 acres, an increase of about 1 percent. The reservoir level typically fluctuates by 75 to 100 feet between spring and fall each year, from a possible range of full pool at elevation 2,240 to the lowest possible level at the outlet of the reservoir at elevation 2,110. Under Alternative 2, the fluctuation would remain the same although the high and low water levels would increase by the amount of additional storage captured in most years. That difference would be 3 feet at full pool and about 5 feet when the reservoir is drawn down. In drought years, the reservoir would not fill to elevation 2,240, so no additional storage would occur and the reservoir fluctuation would remain the same as existing conditions.

The additional storage would occur in spring and early summer when high flows fill the reservoir. Reclamation would allow the reservoir to fill to the higher level in years when adequate runoff is available. Currently, Reclamation discharges flows in excess of the existing storage capacity of the reservoir to the Cle Elum River in late April to late June. While the reservoir is filling up to elevation 2,240, releases from the reservoir are variable and typically in excess of the minimum winter release of 220 cfs. When water supply conditions are poor, the minimum release can fall to180 cfs. Those minimum releases would continue until the reservoir receives the additional storage, if sufficient water supply is available.

To fill the additional storage volume, a decrease in flow would occur in the Cle Elum and Yakima rivers relative to the existing condition between the time the reservoir reaches the current full pool level of elevation 2,240 and the time the reservoir fills to elevation 2,243. (Under existing conditions, the water could not rise above elevation 2,240 and would be spilled into the Cle Elum River.) This reduction in flow would be short-term, lasting on average 5 days as predicted by hydrologic modeling. The reduction in flow would occur in spring or early summer, when the stored water would represent a small percentage of the seasonally high flow in the Yakima River (averaging 3,500 to 5,000 cfs from April to June). Reclamation would fill the additional storage outside of much of the important March 15 through May smolt outmigration window. Reclamation would monitor flows during the smolt outmigration window and avoid filling the additional storage during that time period to avoid downstream flow reductions of sufficient magnitude to negatively impact smolts

Figure 4-1 illustrates the reservoir pool elevation for this alternative in a typical sequence of years (water years 1998 to 2002). Reclamation selected this sequence of years for modeling because it contains years with average volumes of inflow to Cle Elum Reservoir (1998, 2000, and 2002), a year with a high volume of runoff (1999), and a severe drought year (2001).

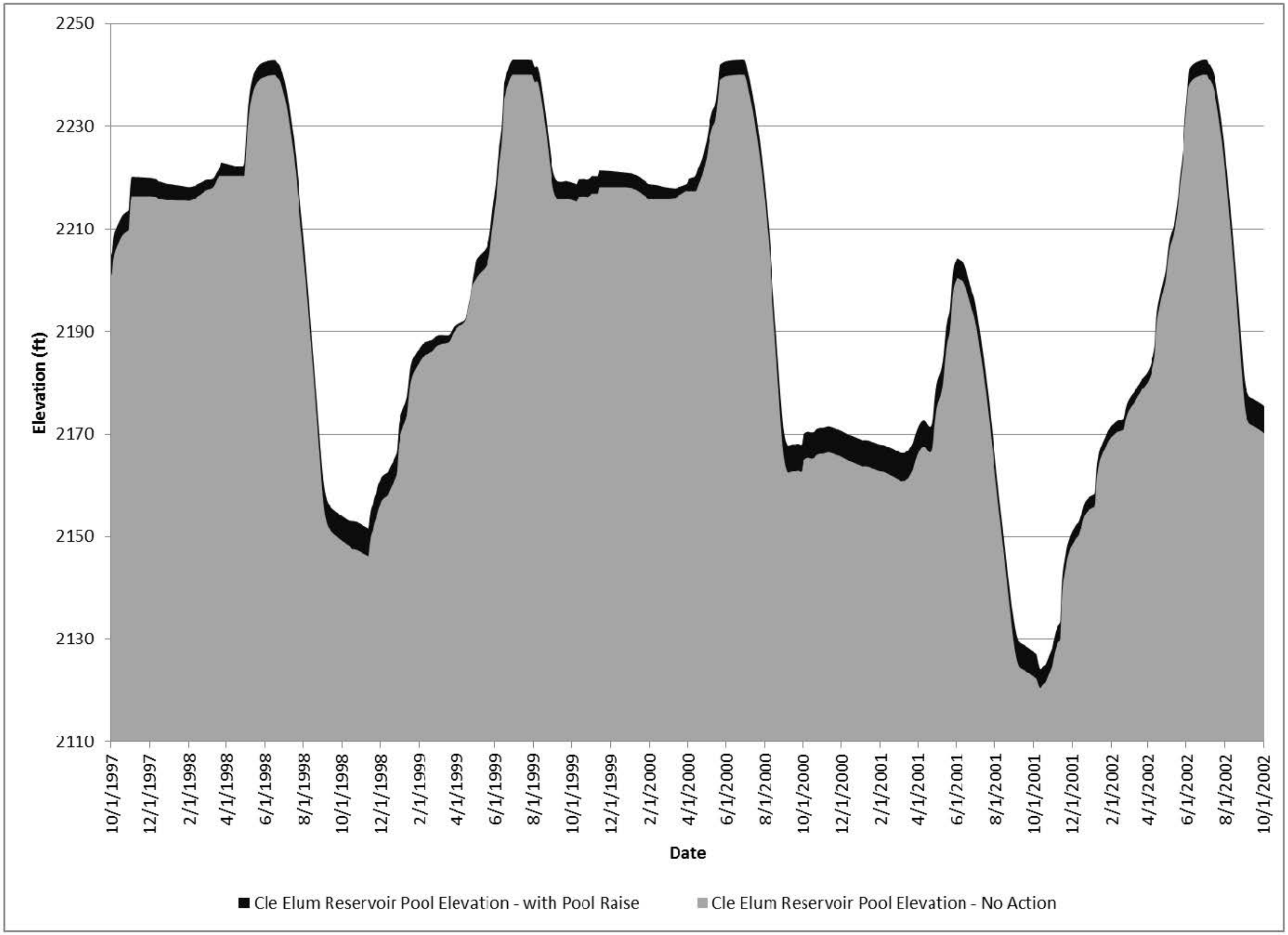

Figure 4-1. Cle Elum Pool Elevation – No Action Compared to Alternative 2

Hydrologic modeling indicates that the existing full reservoir elevation of 2,240 would be exceeded in about 72 percent of the years modeled and the proposed reservoir elevation of 2,243 would be reached in about 52 percent of the years modeled. On average, reservoir levels would exceed elevation 2,240 on June 2 and stay above that level until July 10 in the years when sufficient runoff occurs to fill the reservoir above elevation 2,240. Under Alternative 2, the average duration of pool elevation above elevation 2,240 is about 39 days in the years when sufficient runoff occurs. Table 4-2 lists the starting and ending dates for the additional storage.

Table 4-2. Starting and Ending Dates for Additional Storage, Alternative 2

Reservoir Level	Date		
	Average	Earliest	Latest
When reservoir level exceeds elevation 2,240	June 2	April 21	June 25
When reservoir level drops below elevation 2,240	July 10	May 29	August 11

4.2.4.2 Additional Storage Capacity for Instream Flows

Operation

Reclamation anticipates that use of the additional storage capacity for instream flows may change annually and over time due to improved knowledge of instream flow needs and specific flow needs identified in any particular year. For that reason, Reclamation would manage the additional storage with the advice of SOAC to maximize benefits to instream flows. The following sections describe five scenarios for how Reclamation would use the additional storage capacity for instream flows.

Scenario 1 – Improve Winter Flows

A high priority instream flow need identified for the Cle Elum River is improved winter rearing conditions (Reclamation and Ecology, 2011g). For this scenario of instream flow use, the additional storage capacity would be released during fall and winter (October to March) to increase instream flow in the Cle Elum River and increase overwintering habitat for fish. The additional storage capacity would increase instream flows by approximately 36 cfs for 6 months. The current minimum release during winter from Cle Elum Reservoir ranges from 180 to 220 cfs, depending on water supply conditions. The typical minimum release is 220 cfs. Water from the Cle Elum Pool Raise Project could be used to supplement minimum flows established by Reclamation. The release of an additional 36 cfs would raise winter Cle Elum River instream flows to over 250 cfs in most years. The additional instream flow due to release from the reservoir could occur in 59 percent of the years modeled.

Under No Action conditions, hydrologic modeling indicates that a winter flow rate of 250 cfs is achieved only 14 percent of the time. With Alternative 2, a winter flow rate of 250 cfs would be achieved 41 percent of the time. The increase in winter flows in the Cle Elum River would be a positive impact.

Reclamation may release water equal to the increased volume stored at Cle Elum Reservoir at other times of the year at varying rates and from other Yakima Project reservoirs in lieu of releases from Cle Elum Reservoir, as stated in Section 1205(b) of 108 Stat. 4526 USC. However, Reclamation does not anticipate this would occur outside the existing operational ranges of those other reservoirs. Figure 4-2 illustrates the outflow from Cle Elum Reservoir (equal to flow in the Cle Elum River) in a typical sequence of years (water years 1998 to 2002) for this scenario.

The primary benefit of increased winter instream flow would be improved salmonid overwintering habitat in the Cle Elum River. Flows would also increase in the Yakima River downstream from the confluence with the Cle Elum River. However, the magnitude of the effect would diminish moving downstream as other tributaries contribute flow until Roza Dam. The most critical river reach for winter flows is between Roza Dam and the Naches River. An additional 36 cfs represents 9 percent of the low flows experienced in that reach. In the Yakima River downstream from its confluence with the Naches River, the average winter flow is about 3,000 cfs (Parker gage). The difference in flow from the change in operations at Cle Elum Dam would be about 1 percent, which is not measureable and would have no impact. Overall, the increased winter flows in the Yakima River would be a positive impact.

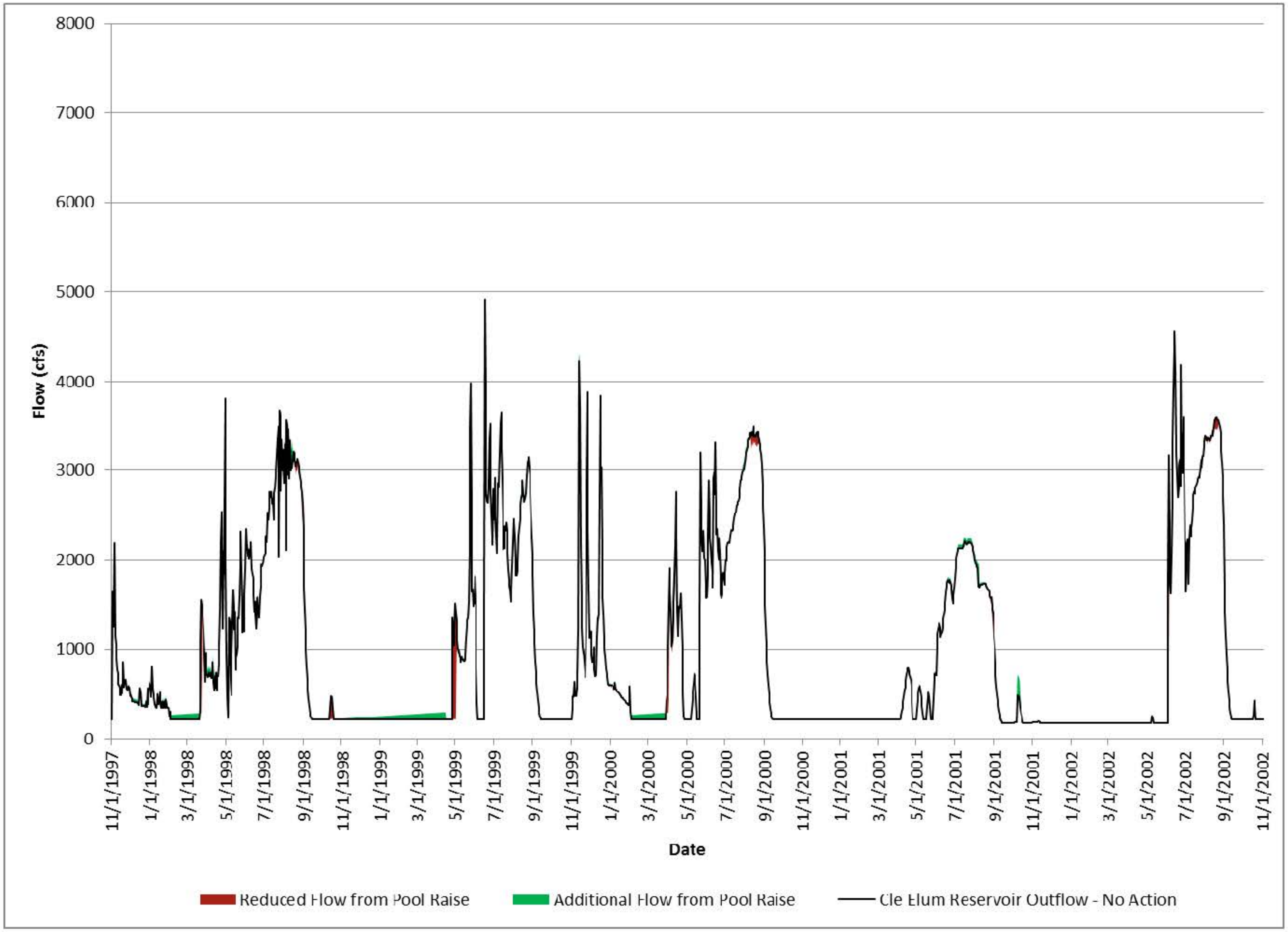

Figure 4-2. Outflow from Cle Elum Reservoir – No Action Alternative Compared with Alternative 2

Scenario 2 – Improve Flow Conditions during Smolt Outmigration Period

For this scenario, the additional storage between elevation 2,240 and 2,243 would not be filled in the mid-March through May outmigration time period for kelts and smolts and additional flows would be released during that time period to aid in outmigration. Additional flows would be released when forecasts indicate there would be sufficient runoff to fill Cle Elum Reservoir to at least elevation 2,240. The additional flow volume released would be up to the 14,600 acre-feet that could be stored with the Cle Elum Pool Raise project. The flow would be released in a pulse or pulses to provide flow conditions more similar to an unregulated river during spring. The flow pulse would increase flows in the Cle Elum River to about 1,000 cfs at its peak (Thomas, 2015).

The percentage increase in flow in the Cle Elum River based on no action average flows (Table 3-1) for mid-March through May would be between 13 and 230 percent. During periods when the minimum release of 220 cfs is occurring, the increase would be 450 percent. This would be a significant positive impact. Downstream in the Yakima River, the percentage increase would be less (23 to 32 percent for mid-March through May in the reach between Cle Elum River and Roza Dam) and would have a positive impact.

As described Section 4.2.4.1, hydrologic modeling estimates that in 52 percent of the years an additional 14,600 acre-feet of storage would occur. In 20 percent of the years, some storage would available for instream flows and in 28 percent of the years no additional storage would be available.

Scenario 3 – Increase Summer Flow in Lower Yakima River

For this scenario of instream flow use, water from the additional storage capacity would be released during summer to help adult sockeye and summer Chinook migrate from the Columbia River up the Yakima River. Water would be released in a pulse or pulses and would be timed to coincide with cool temperature periods when river temperatures are acceptable to fish. The size and duration of pulse would be variable and would likely use 4,000 to 7,000 acre-feet to achieve the goal of aiding fish migration (Hubble, 2015). The water used for a pulse could be released from other Yakima Project reservoirs as stated in Section 1205(b) of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434) (108 Stat. 4550 USC). In that case, the water in the additional storage in Cle Elum Reservoir would be released at other times to make up for water released from other reservoirs.

Figure 4-3 provides an example of a cool temperature period in July 2014 when Chinook salmon and sockeye migrated upstream from the Columbia River past Prosser Dam. Figure 4-3 shows fish migration past Prosser Dam compared to Yakima River water temperatures at the Kiona gage. Prosser Dam contains an adult fish counting station operated by the Yakama Nation under a Yakima/Klickitat Fisheries Project contract with the Bonneville Power Administration (Yakima/Klickitat Fisheries Project, 2015). The number of fish that were counted at Prosser Dam was negligible before and after the cool temperature period. When temperature in the Yakima River decreased to about 22°C (72°F), fish started migrating past Prosser Dam. The average daily river temperature decreased to 20°C (68°F) during the cool temperature period which substantially increased fish migration. That temperature is about 12 °C (10 °F) cooler than temperatures immediately preceding that period. This scenario would provide additional flow at temperatures favorable for adult fish migration and would have a positive impact on summer flows in the lower Yakima River.

The releases would increase summer flow in the Cle Elum River for a short period of time, likely 1 week or less. The increase in flow in the Cle Elum River would be up to 500 cfs (1,000 acre-feet/day) if 7,000 acre-feet were released. Under no action conditions, flow in summer in the Cle Elum River averages about 2,400 cfs. The flow pulse could result in about a 20 percent increase in flows if releases were made on top of average demands. A smaller percentage increase in flow would result in the Yakima River between Cle Elum River and Sunnyside Diversion Dam as flows are greater in that reach. Downstream from Sunnyside and Prosser dams, the flow increase would be much greater as target flows are as low as about 360 cfs. The flow pulse could more than double the flow in those reaches.

Reclamation would have the ability to release the pulse from other reservoirs in the Yakima Project. Reclamation would manage the releases from all the Yakima Project reservoirs to optimize flow conditions downstream of Sunnyside and Prosser dams.

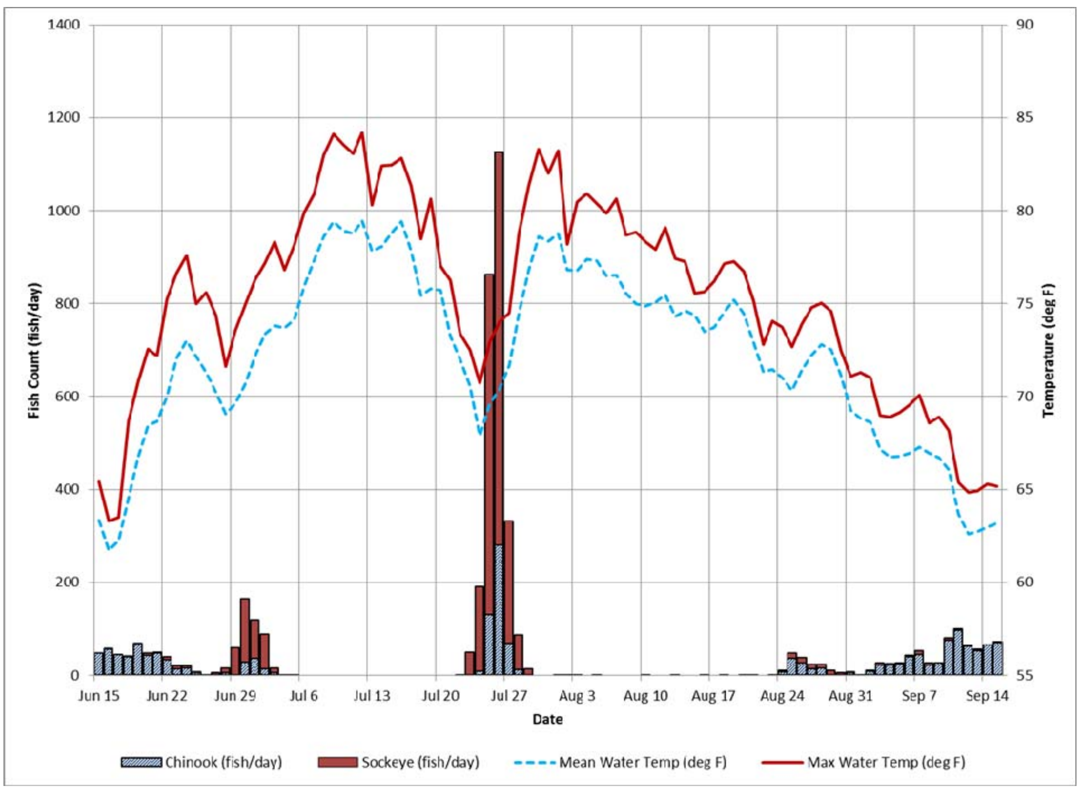

Figure 4-3. Fish Counts at Prosser Dam compared to Yakima River Temperature at Kiona Gage during Summer 2014

Scenario 4 - Carryover for Fish Passage

For this scenario of instream flow use, Reclamation would store water in the additional storage capacity but not release it for instream flows (a process called "carryover storage"). The higher reservoir level created by the retained water would increase the length of time during which outmigrating juvenile salmon could use the proposed Cle Elum fish passage facilities, in part by allowing earlier operation than would otherwise be the case. The design of the fish facility would allow passage when reservoir levels are greater than elevation 2,180. The target date to reach that operating level in order to provide downstream passage for smolts is April 1. Under conditions of the No Action Alternative, that level would be reached by April 1 in 68 percent of the years. In the other years, the corresponding date would be April 30, on average. In the years when the additional water would be carried over, elevation 2,180 would be reached 2 to 23 days earlier, with an average improvement of 6 days earlier. This scenario would have a positive impact on Cle Elum Reservoir elevations and would aid fish passage.

Scenario 5 – Combination of Scenarios 2 through 4

For this scenario of instream flow use, the additional storage would be carried over in whole or in part to aid in downstream fish passage. Once the necessary fish passage elevation has been reached, the stored water would be released to increase instream flow for outmigrants in mid-March through May and/or for increased instream flow during summer to aid adult salmon migrating from the Columbia River into the Yakima River. This scenario would provide flexibility in using the additional storage capacity and would allow Reclamation the opportunity to tailor flow releases to meet fish needs for that year.

The additional storage volume used for instream flow releases under this scenario would range from 0 to 14,600 acre-feet from mid-March through May and the remainder of the storage up to 14,600 acre-feet would be used in summer or carried over to the next year. The increase in flow in the Cle Elum and Yakima rivers during the mid-March through May time period would range up to an average of 96 cfs. The volume of flow released during late summer to aid fish migration in the lower Yakima River would range from 0 to 7,000 cfs.

This scenario would have a positive impact on Cle Elum Reservoir water levels and would have a positive impact on spring (mid-March through May) flows in the Cle Elum River and on summer flows in the lower Yakima River. The benefits from each will be less than in the scenarios where the additional storage is used for a single purpose. No change or impact to Cle Elum River or Yakima River winter flows would result from this scenario.

4.2.4.3 Rock Shoreline Protection

Construction

Construction activities for shoreline protection would not affect reservoir storage or releases because Reclamation would complete the work when the reservoir is drawn down, typically in the fall. During that period, reservoir levels typically range from elevation 2,150 to 2,200, which is 40 to 90 feet in elevation below the work area.

Operation

The completed shoreline protection would not affect reservoir storage or releases because the radial gates control the operation of the reservoir. The volume of rock and fill placed below elevation 2,243 for this activity is reflected in the estimated storage increase of 14,600 acre-feet.

4.2.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Construction activities for the work proposed to increase freeboard and protect the saddle dikes and the right dam abutment would not affect reservoir storage or releases because Reclamation would complete the work when the reservoir is drawn down, typically in the fall. During that period, reservoir levels are typically at elevation 2,150 to 2,200, which is 40 to 90 feet in elevation below the work area.

Operation

The completed work at the saddle dikes and right dam abutment would not affect reservoir storage or releases because these facilities are located above the reservoir pool level. Reclamation would place the rock and fill for this activity above elevation 2,243 so as not to affect volume.

4.2.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction activities for shoreline protection would not affect reservoir storage or releases because Reclamation would complete the work when the reservoir is drawn down, typically in the fall. During that period, reservoir levels typically range from elevation 2,150 to 2,200, which is 40 to 90 feet in elevation below the work area.

Operation

The completed shoreline protection for public lands and facilities and access would not affect reservoir storage or releases. The volume of rock, fill and wood placed below elevation 2,243 for this activity would not affect the estimated increase in storage of 14,600 acre-feet.

4.2.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction activities for improving habitat at stream mouths would not affect reservoir storage or releases because Reclamation would complete the work when the reservoir is drawn down, typically in the fall. During that period, reservoir levels typically range from elevation 2,150 to 2,200, which is 40 to 90 feet in elevation below the work area.

Operation

The completed habitat improvements would not affect reservoir storage or releases. The volume of wood placed below elevation 2,243 for this activity would not affect the estimated increase in storage of 14,600 acre-feet.

4.2.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.2.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.2.4.1).

4.2.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.2.4.2).

4.2.5.3 Hybrid Shoreline Protection

Construction

Construction activities for shoreline protection would not affect reservoir storage or releases as Reclamation would complete the work when the reservoir is drawn down, typically in the fall. During that period, reservoir levels typically range from elevation 2,150 to 2,200, which is 40 to 90 feet in elevation below the work area.

Operation

The completed hybrid shoreline protection would not affect reservoir storage or releases because the volume of fill placed below elevation 2,243 for this activity is reflected in the estimated increase in storage of 14,600 acre-feet.

4.2.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.2.4.4).

4.2.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.2.4.5).

4.2.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.2.4.6).

4.2.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.2.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.2.4.1).

Increased Reservoir Pool

Operation

The volume and surface area of Cle Elum Reservoir with the increased reservoir pool would be the same as for Alternative 2. The reservoir level fluctuation would be similar; the difference is that Reclamation would retain the water accrued from the additional storage capacity under Alternative 4 until needed for water supply purposes. This would maintain higher water levels in the reservoir until drought. That difference would be 3 feet at full pool and about 5 feet at lower reservoir levels when the reservoir is drawn down. The additional storage would accumulate in the spring the same as described for Alternative 2. In the spring of years when the reservoir fills, a slight reduction of flow from the reservoir would occur compared to the no action condition. This reduction would be short-term until the reservoir fills. Reclamation would release the stored water in drought years (years in which the water supply falls below 70 percent of proratable water rights). When the water is released from storage, the flow rate would increase to provide additional downstream water supply. A higher reservoir level created by storing water until drought years would aid fish passage and be a positive impact.

Hydrologic modeling indicates that the existing full reservoir elevation of 2,240 would be exceeded in about 71 percent of the years modeled and that the proposed reservoir elevation of 2,243 would be reached in about 53 percent of the years modeled. On average, reservoir levels would exceed elevation 2,240 on June 1 and stay above that level until July 10 in the years with sufficient runoff. The average length of time the reservoir elevation would be above 2,240 is about 40 days in the years when runoff is sufficient to fill the pool above that elevation. Table 4-3 lists the starting and ending dates when the additional storage would occur. The additional storage would fill above elevation 2,240 earlier, by 1 day on average, compared to Alternative 2. Reclamation would hold the reservoir level above elevation 2,240 for up to 2 days longer under Alternative 4 than under Alternative 2. Figure 4-4 illustrates the reservoir pool elevation in a typical sequence of years for this alternative.

Table 4-3. Starting and Ending Dates for Additional Storage, Alternative 4

Reservoir Level	Date		
	Average	Earliest	Latest
When reservoir level exceeds elevation 2,240	June 1	April 21	June 24
When reservoir level drops below elevation 2,240	July 10	May 31	August 11

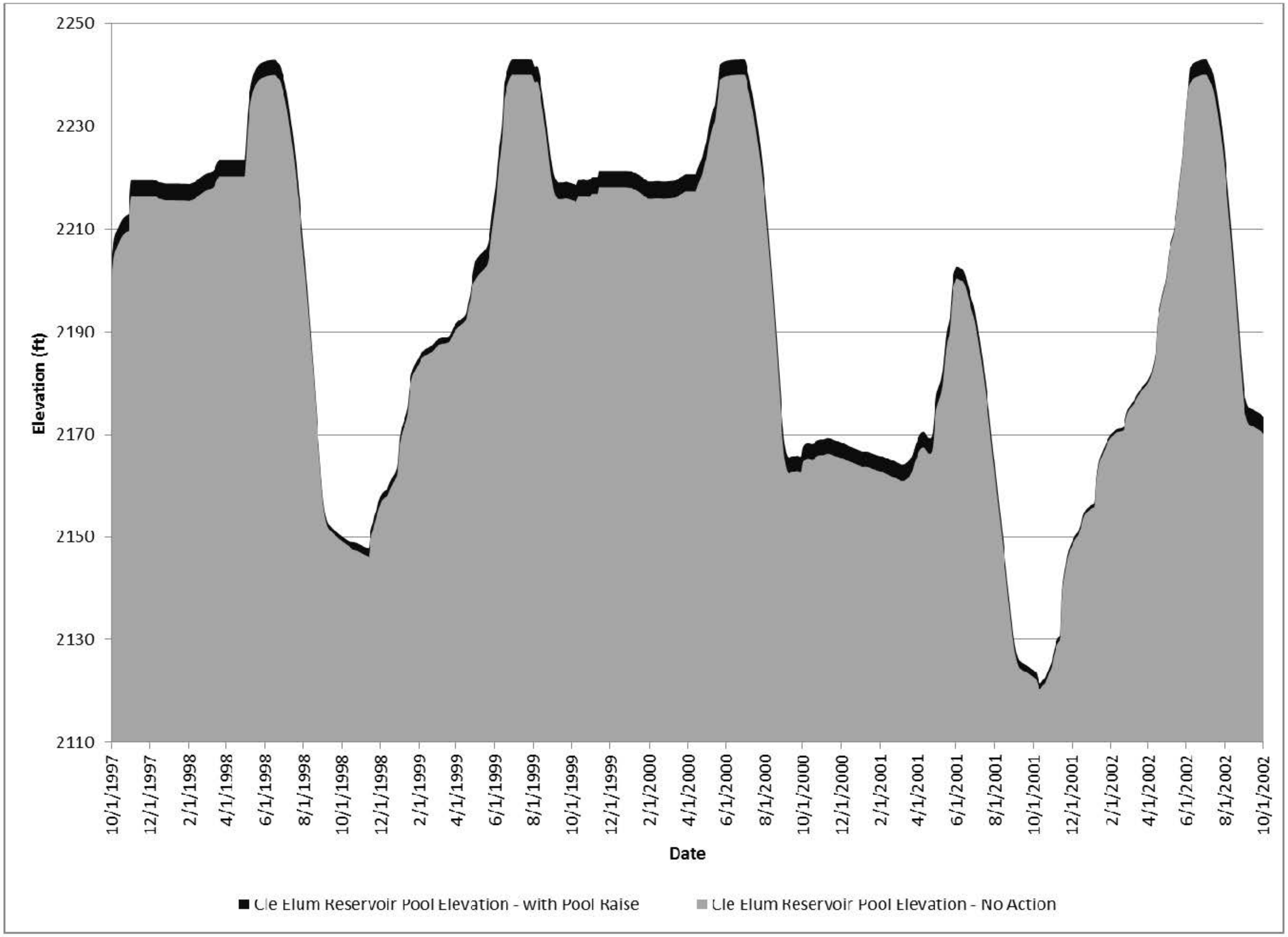

Figure 4-4. Cle Elum Pool Elevation – No Action Alternative Compared to Alternative 4

4.2.6.2 Additional Storage Capacity for TWSA

For Alternative 4, Reclamation would manage the additional storage capacity as part of TWSA, for potential use by proratable irrigation districts and for instream flows. Reclamation anticipates that the primary use of the additional water would be to supply proratable irrigation districts during drought years. Although water allocated to TWSA could be used for instream flows, assuming that it would be used to supply proratable irrigators represents a "worst-case" scenario for fish in this EIS analysis.

If the additional storage capacity is used to increase TWSA, RiverWare modeling predicts a maximum increase, compared to the No Action Alternative, of 1.6 percent in the entitlement supplied on September 30 to proratable users during drought years. The September 30 prorationing level is a measure of the percentage of water right entitlements supplied to proratable irrigation districts during the irrigation season, which ends in early October. A goal of the Integrated Plan is to provide a water supply of 70 percent of entitlements to proratable irrigation districts during drought years. Table 4-4 provides the estimated increase in prorationing levels modeled for the most recent drought years of 1992 to 1994, 2001, and 2005.

Table 4-4. Increase in Prorationing Levels during Drought Years – TWSA Scenario

Water Year	September 30 Prorationing Level (percent of entitlement)		
	No Action Alternative (modeled)	No Action Alternative (modeled)	No Action Alternative (modeled)
1992	67.2	68.8	1.6
1993	58.6	59.0	0.4
1994	26.3	26.4	0.1
2001	39.6	40.8	1.2
2005	45.0	45.9	0.9

The proratable water users that would benefit from an increase in water supply provided by this project include the Kittitas Reclamation District, Roza Irrigation District, Wapato Irrigation Project, and to a lesser extent, the Kennewick Irrigation District and other proratable water users. The increased water supply would increase reliability for irrigators in these districts; however, it would not fully meet the Integrated Plan goal of 70 percent of entitlements for proratable irrigation districts during droughts, as indicated in Table 4-4. Water supply improvements would also provide some flexibility to adapt to climate change as described in Section 4.12. The increased water storage would have a positive impact on water supply for proratable water users.

Hydrologic modeling indicates the increase in TWSA would occasionally trigger an increase in target instream flows at Parker gage and Prosser Dam, per the requirements of the Yakima River Basin Water Enhancement Project legislation (108 Stat. 4526 USC Section 1205). The increase would occur for a short period of time, typically less than 2 weeks, in the summer of average to wet years. The maximum incremental increase in release from Cle Elum Reservoir into the Cle Elum River would be 150 cfs, constituting only a small fraction of the total 3,000 to 3,500 cfs release during that time.

Figure 4-5 illustrates the outflows from the reservoir in a dry year for the No Action Alternative compared with Alternative 4. The figure shows slightly increased flows during the summer when Reclamation releases the additional storage capacity for instream flow or for water supply for proratable irrigation districts. A dry year was selected for this comparison as very little change in outflow would occur in other years.

The additional release to the Cle Elum River during summer has the potential to exacerbate existing high flow problems. However potential issues would be partially offset because the water would be released during drought years when flows would be lower than typical. At the time the additional storage is released, flow in the Cle Elum River would remain within its current operating range and no impact to the Cle Elum River would occur.

At the time the additional storage is released, flow in the Yakima River would remain within its current operating range and no impact to the Yakima River would occur.

4.2.6.1 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.2.4.3).

4.2.6.2 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.2.4.4).

4.2.6.3 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.2.4.5).

4.2.6.4 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.2.4.6).

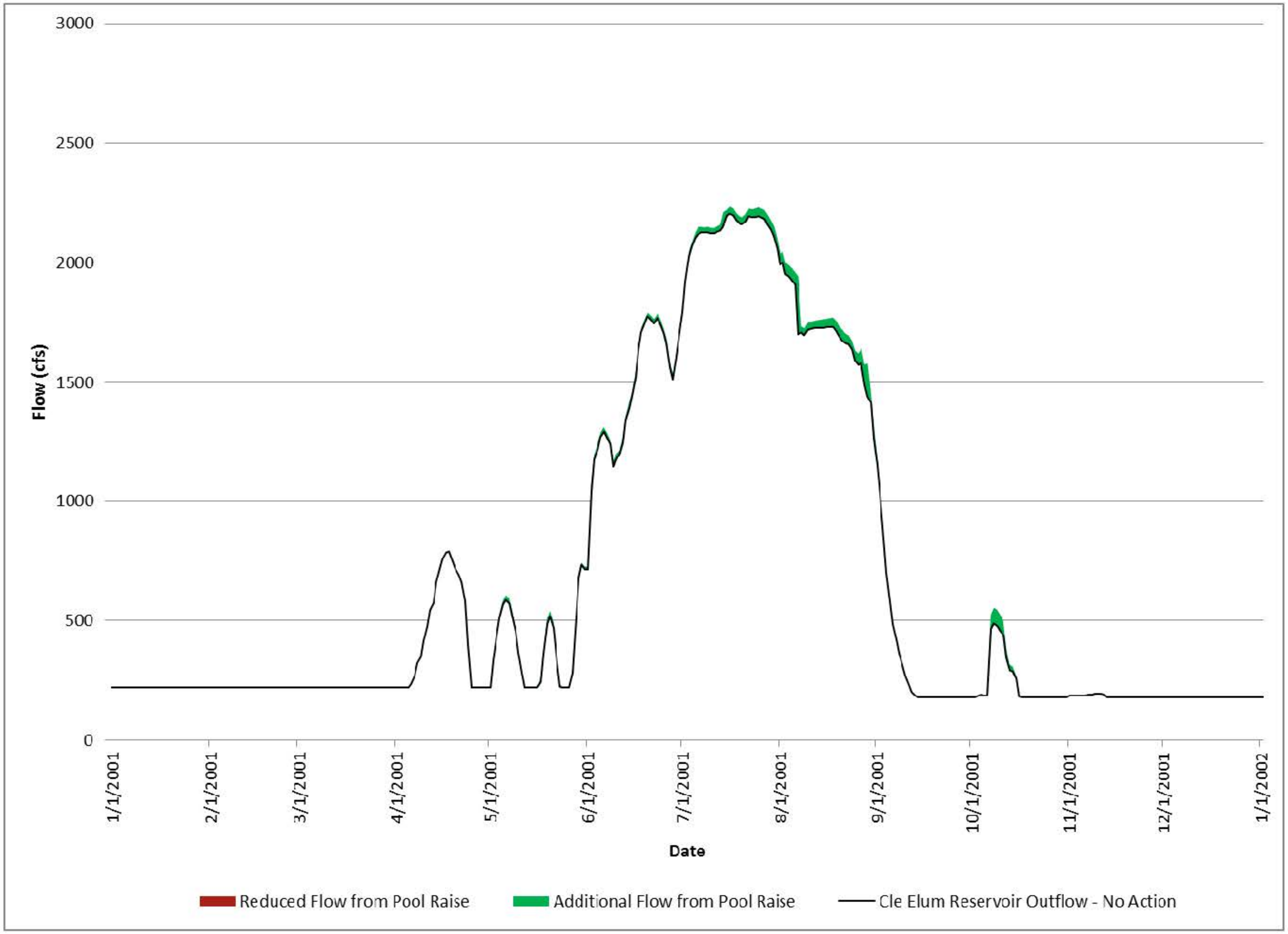

Figure 4-5. Cle Elum Reservoir Outflow – No Action Alternative Compared with Alternative 4

4.2.7 Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection

4.2.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.2.4.1).

4.2.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.2.6.2).

4.2.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.2.5.3).

4.2.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.2.4.4).

4.2.7.5 Shoreline Protection for Federal Recreation Facilities and Access

Impacts would be the same as for Alternative 2 (Section 4.2.4.5).

4.2.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.2.4.6).

4.2.8 Mitigation Measures

The proposed project and its alternatives would not negatively impact water releases or water supply during construction. Implementation of the project would have a positive impact on instream flow or water storage capacity, which is consistent with the goals of the project. Therefore, there is no need for mitigation.

4.3 Earth Resources

4.3.1 Methods and Impact Indicators

Reclamation evaluated potential impacts of the alternatives after field review of shoreline areas and existing erosion characteristics, and analysis of potential wave action on shorelines (Reclamation, 2014c). The area of impact analysis is the shoreline of Cle Elum Reservoir and the banks of the Cle Elum River downstream from the reservoir. Section 4.4, Water Quality, describes the potential for increases in sedimentation or turbidity from erosion.

Table 4-5 shows earth impact indicators and criteria for determining impact significance. Reclamation measured impacts relative to the No Action Alternative.

Table 4-5. Earth Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Erosion during construction	Erosion substantial enough to cause sediment entrainment in the reservoir that exceeds water quality standards and cannot be managed by construction best management practices (BMPs)
Potential for shoreline erosion around Cle Elum Reservoir	Erosion substantial enough to cause bank sloughing and sediment deposition that cannot be managed by BMPs and bank stabilization methods proposed for the alternative
Potential for erosion in Cle Elum River	Increased erosion in the Cle Elum River downstream from the dam that would violate State water quality standards for turbidity and impact fish
Slope stability and seismic risks associated with the higher reservoir level	High instability with a reasonable chance of substantial damage associated with the higher reservoir level Increased seismic risk to the dam from the higher reservoir level

4.3.2 Summary of Impacts

With the No Action Alternative, shoreline erosion would continue as it does under existing conditions. Ongoing dispersed camping and day use activities near the north end of the reservoir would continue to cause erosion on the shoreline and reservoir bed. Reconstructing the interim fish passage facility would not cause erosion because all construction would take place on the dam spillway. Construction associated with reconstructing the interim fish passage facilities and constructing the permanent fish passage facilities and YRBWEP Phase II conservation projects would cause short-term and minor erosion of sediments during construction. Only minor long-term impacts would occur from potential soil disturbance caused by vehicle traffic servicing trap and haul facilities for the permanent fish passage facilities.

Under the action alternatives, short-term impacts on earth would occur from erosion of sediments exposed to rainfall or wind during construction. Potential long-term impacts on earth would be an increase in shoreline erosion. No change in the potential for erosion in the Cle Elum River or in slope stability or seismic risks would result from the action alternatives.

4.3.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, existing shoreline erosion would continue unless Reclamation or other property owners install shoreline protection. In its shoreline reconnaissance, Reclamation noted that shoreline erosion currently occurs in many areas around the perimeter of the reservoir, including many near-vertical slopes (Reclamation, 2014c). Rock riprap protects some shorelines along the east side of the reservoir, but no shoreline stabilization is located on the west side of the reservoir.

The rock riprap on shorelines on the east side of the reservoir appears to have mostly stopped erosion caused by inundation and waves. In some areas with rock riprap at the toe of the bank, the banks are steeper than a natural, stable slope and are not vegetated. Those slopes would continue to erode slowly from weathering under the No Action Alternative. As part of the No Action Alternative, Reclamation would continue to implement its existing monitoring and maintenance program of shoreline erosion as described in Section 2.4.3.5.

Reclamation would reconstruct the existing interim fish passage facilities and the new permanent fish passage facilities. Reconstruction of the interim fish passage facilities would not cause increased erosion because construction would take place on the existing dam spillway and no earth would be disturbed. Construction of the two conservation projects included in the YRBWEP Phase II conservation program (Section 2.3.1.4) would not increase erosion or impact earth resources.

Most construction would occur when the reservoir is drawn down reducing the potential for erosion. Construction of the juvenile bypass conduit, construction of access roads, and clearing and grading would disturb upland soils and may cause increased erosion. Construction of facilities downstream from the dam (fish ladder, adult collection facility) would utilize coffer dams in the Cle Elum River, minimizing the potential for erosion. Reclamation would implement BMPs during construction to reduce the potential for erosion. Construction-induced erosion is expected to be minor and would be controlled through BMPs and containment measures to prevent eroded soil and sediments from entering the river; therefore, no significant impacts on water quality are expected.

Operation of the interim fish passage facilities or the permanent fish passage facilities would not increase erosion around the reservoir because operation would involve only minimal soil disturbing activities associated with vehicles traveling on dirt roads as part of the adult trap and haul activities. Erosion in downstream areas would not increase as the fish passage facilities will not change flow releases.

Dispersed recreation currently occurs on the north end of the reservoir at Dry Creek, Morgan Creek, French Cabin Creek, and along the upper Cle Elum River near the NF-4308 bridge. This dispersed recreation includes camping and driving of vehicles on the reservoir bed which causes erosion of the shoreline and reservoir bed. Erosion impacts from dispersed recreation would continue and potentially increase under the No Action Alternative.

4.3.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.3.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

There are no anticipated short-term impacts on earth from modifying the existing radial gates of Cle Elum Dam to raise the reservoir level. All work to modify the radial gates would take place on the existing dam and no soil disturbance would occur.

Operation

Operation of the radial gates would not affect earth or increase erosion at Cle Elum Dam because the gates are situated on an erosion-resistant, reinforced concrete spillway.

Increased Reservoir Pool

Operation

Increasing the pool elevation at Cle Elum Reservoir by 3 feet would increase shoreline erosion in some areas as the new shoreline is established. The estimated additional inundated area is approximately 46 acres, measured using LiDAR data. To reduce bank erosion and protect infrastructure and private property, Reclamation proposes shoreline stabilization along approximately 3 miles of shoreline, primarily on the east shore of the reservoir. Section 2.4.3 describes the locations and types of erosion protection proposed. The areas proposed for protection have a western exposure, have a fetch length (length across the reservoir where there is no wind obstruction) of more than 2 miles, and are subject to wind-driven waves. Reclamation would extend erosion protection to elevation 2,246 (3 feet above the proposed high water level of elevation 2,243). Reclamation determined that this 3-foot zone would adequately protect against additional erosion, based on both wind-wave analyses and review of existing erosion patterns above the current high water level of elevation 2,240.

Erosion of shoreline banks is expected in certain areas around the reservoir where no shoreline stabilization is proposed, mainly federally-managed lands on the west side of the reservoir. The predominant wind pattern during the period of inundation above elevation 2,240 is from west to east, making the east side of the reservoir much more susceptible to erosion from wind-driven waves.

In its reconnaissance of the west shoreline, Reclamation identified about 8,300 feet of shoreline that would be susceptible to additional erosion based on fetch length and site conditions (Reclamation, 2014c). That length is equal to approximately 17 percent of the total west shoreline. Reclamation estimated that with the Cle Elum Pool Raise Project approximately 2 to 5 acres of area would be lost and 17,000 to 34,000 cy of material could erode into the reservoir over a 50-year period. Those estimates are conservative and represent a condition where no shoreline protection would be installed to prevent erosion. The estimated erosion loss associated with installation of shoreline protection on those same slopes would be greater—15 to 17 acres and 34,000 cy of soil disturbance. For this reason, Reclamation does not plan to install shoreline protection on all of the west shore. Shoreline protection is proposed on approximately 5,000 feet of privately-owned property in the southwest corner of the reservoir and on Federal land on the west shore (Figure 2-8). In other areas, natural shoreline erosion would occur.

Surface sediments around much of the reservoir are classified as glacial till and glacial drift, containing ash, loam, and material as large as cobbles. Eroded material would contain those types of material as well as trees and vegetation. The eroded material would travel into nearshore areas where the coarsest material, such as cobbles and large gravel, would form an armor layer on the newly eroded shoreline. Finer material, such as loam, ash, and silt, would be carried farther away from the shoreline and either deposit in deeper areas or be carried as suspended sediment out of the reservoir. Sand and small gravel would likely form part of a sub-armor layer below the cobble and large gravel armor layer or be carried away from the shoreline to areas below the reservoir's low operating level not subject to major erosion, which ranges from elevation 2,130 to 2,170.

The rate of erosion that would occur along unprotected shorelines is unknown; however, reviewing existing shorelines that have been subject to inundation and wave erosion over the 80-year operating life of the reservoir provides an indication of erosion rates. Future shoreline conditions above elevation 2,240 would likely be similar to existing shorelines if left unprotected. Reclamation assumed a conservative (high) estimate of the rate of erosion for the purposes of this EIS. The assumption is that all of the erosion predicted by Reclamation would occur in the first 50 years of operation of the Cle Elum Pool Raise Project. The rate of erosion may be higher in the first years after raising the reservoir level as looser topsoil and trees would erode first, exposing underlying sediments that are more densely consolidated and more erosion-resistant, thus slowing the rate of erosion. However, the reservoir would fill above the current high water elevation of 2,240 in about 72 percent of the years and remain above elevation 2,240 for about 40 days. The short duration of higher inundation would also limit the rate of erosion.

The higher reservoir level creates a high potential for shoreline erosion around Cle Elum Reservoir. This erosion would be considered a negative impact. However, the potential impact is not considered significant because it is anticipated that Reclamation could manage any bank sloughing caused by increased erosion through its annual inspection and maintenance of shoreline conditions (Section 2.4.3.5). The increased erosion could cause localized increases in turbidity above State criterion, but the increases would be temporary and not likely to have an impact on overall water quality (Section 4.4.4.1).

Reclamation conducted a geological and geotechnical analysis of Cle Elum Dam in 2000 to evaluate dam safety issues under existing operating conditions and with a 3-foot elevation raise in the reservoir (Reclamation, 2000b). The study concluded the 3-foot pool raise would not affect the failure potential of the dam. The higher reservoir level under the Proposed Action is unlikely to cause landslides or slope movement in the reservoir area. Both the existing reservoir elevation (2,240) and the proposed higher elevation (2,243) are lower than the likely high water elevation of the historical glacial lake (2,253). Any potentially unstable areas or slides would have failed from seepage under historical conditions. Glacial Lake Cle Elum would have been exposed to significant seismic loading that would have caused slope failures at higher lake levels. The Cle Elum Reservoir shoreline is generally dominated by bedrock, and there are no indications of recent or historical large-scale slope failures or landslides within the reservoir basin. The higher reservoir level would not increase pore pressures above historical levels and therefore is not likely to increase the potential for slope failure. Slope stability and seismic risks would not change with this alternative and no significant impact would occur.

4.3.4.2 Additional Storage Capacity for Instream Flows

Operation

The potential changes in instream flows in the Cle Elum River downstream from the reservoir and in the Yakima River downstream from the mouth of the Cle Elum River would not affect erosion because the changes would be small relative to existing river flows. Potential scenarios for filling the reservoir and releasing the water for instream flows, including the pulse flows in Scenario 2, would not create fluctuations in water levels that are substantially different than those that have been experienced historically (Section 4.2.4.2). Therefore, annual operation of Cle Elum Reservoir to improve instream flows would have no effect on erosion at the reservoir, in Cle Elum River downstream from the dam, or the Yakima River.

The fifth scenario is a combination of the second through fourth scenario. The impacts would be the same as described for those scenarios.

4.3.4.3 Rock Shoreline Protection

Construction

Even though BMPs would be used to reduce potential erosion, short-term impacts on earth such as erosion are possible with clearing and vegetation removal, construction of access routes and staging areas, soil compaction, excavation, filling, hauling, and placement of rock on shoreline banks. Impacts on earth associated with these activities would be temporary, and disturbed areas would be restored immediately following construction. Reclamation does not expect impacts to be significant. Shoreline protection would be installed when the reservoir is drawn down to a level below the work areas to help reduce potential erosion. Reclamation would not increase the reservoir level until all proposed shoreline protection measures were completed.

Operation

The proposed rock shoreline protection includes bank reshaping, stabilization with rock riprap, and revegetation. The protection would reduce erosion wherever installed, resulting in minimal long-term impacts due to increased erosion. Rock shoreline protection would not affect erosion downstream from the dam.

In other areas of shoreline around the reservoir, erosion would occur as described for the increased reservoir pool. Reclamation would continue to implement its existing annual inspection and maintenance for shoreline erosion as described in Section 2.4.3.5. If erosion problems are identified, Reclamation may repair existing rock shoreline protection or install new rock shoreline protection to protect private property or infrastructure. These measures may cause minor, short-term increases in erosion during construction, but would reduce long-term erosion.

4.3.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Construction impacts would be similar to those described for rock shoreline protection in Section 4.3.4.3; minor short-term impacts that can be managed by construction BMPs may occur. Construction of the dam previously disturbed the area and some shoreline protection already exists on the saddle dikes and right dam abutment, reducing the amount of clearing needed. This component of Alternative 2 includes construction of approximately 0.1 mile of access road, 2 acres of clearing, 5,000 cy of fill, 2,400 cy of riprap, removal of existing asphalt, construction of a new boat ramp, and 1.2 acres of revegetation.

Operation

No long-term impacts of increased erosion on the right dam abutment and saddle dikes are expected, because the measures to increase the freeboard would also provide increased erosion protection for those features. The right dam abutment and saddle dikes would not affect erosion downstream from the dam.

4.3.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction impacts would be similar to those described for rock shoreline protection in Section 4.3.4.3, and Reclamation does not expect them to be significant. This component of Alternative 2 includes approximately 2.8 acres of clearing, 9,200 cy of fill, 6,100 cy of riprap, removal of existing asphalt, repair of roads, construction of a new boat ramp and 2.3 acres of revegetation. For the west shoreline where stabilization may use on-site driftwood, trees, and vegetation, similar but lesser construction impacts would occur as hand methods and no heavy machinery would be used.

Operation

The proposed shoreline work would protect shorelines, campgrounds, and roads from future erosion, resulting in minimal long-term impacts to earth. The shoreline work would not affect erosion downstream from the dam.

4.3.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction impacts would be minimal as Reclamation would not clear or excavate soil and would use existing, onsite driftwood, trees, and vegetation as stabilization material. No heavy equipment would be used. No short-term impacts to erosion will occur.

Operation

The proposed work would reduce erosion and slope stability at three streams entering Cle Elum Reservoir. No negative impacts to shoreline erosion would occur.

4.3.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.3.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the higher reservoir pool would be the same as for Alternative 2 (Section 4.3.4.1).

4.3.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.3.4.2).

4.3.5.3 Hybrid Shoreline Protection

Construction

Construction impacts would be similar to those described for rock shoreline protection in Section 4.3.4.3, although the areal extent of impacts could be greater since some of the protection measures require disturbance and clearing of more area. Reclamation expects impacts to be of short term, localized, and not noticeable after construction is complete.

Operation

Hybrid shoreline protection would incorporate techniques that may keep more shoreline bank slopes exposed to wave erosion than rock shoreline protection and would, therefore, result in more erosion. For example, perched beaches would expose sediments to erosion. Fine-grained sediment may be eroded out of the fill placed for the perched beach and create turbidity in near-shore areas. The fine-grained material would winnow out of the placed beach sediments when exposed to waves. That process may occur within a few years after construction is completed, depending on whether the reservoir fills above elevation 2,240 and whether wind-driven waves occur when the reservoir is above that level. Techniques such as log terraces and bioengineered slope treatments may be more prone to erosion than rock shoreline protection because only parts of the bank would be protected whereas rock would cover the entire bank. However, the former approaches include cutting back the shorelines to create a stable slope and revegetating the shoreline, both of which would minimize erosion and the potential loss of fine sediment into the reservoir. The hybrid shoreline protection measures would protect private property and infrastructure, the same as Alternative 2.

Long-term impacts of hybrid shoreline protection on earth would be minimal, as the protection techniques would protect private property and infrastructure and minimize erosion where installed. Compared with Alternative 2, some additional erosion would occur in the areas where Reclamation does not install rock shoreline protection; however, that additional erosion would be minimal and would not affect the purpose of the hybrid shoreline stabilization, which is to protect private property and infrastructure. Hybrid shoreline protection would not affect erosion downstream from the dam.

4.3.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.3.4.4).

4.3.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.3.4.5).

4.3.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.3.4.6).

4.3.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.3.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.3.4.1).

4.3.6.2 Additional Storage Capacity for TWSA

Reclamation anticipates no short-term impacts on earth from using the additional storage capacity to improve TWSA because there is no construction associated with this element of the alternative. Long-term impacts would be similar to those described for using the additional storage capacity for instream flows (Section 4.3.4.2).

4.3.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.3.4.3).

4.3.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.3.4.4).

4.3.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.3.4.5).

4.3.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.3.4.6).

4.3.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.3.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.3.4.1).

4.3.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.3.6.2).

4.3.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.3.5.3).

4.3.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.3.4.4).

4.3.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.3.4.5).

4.3.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.3.4.6).

4.3.8 Mitigation Measures

4.3.8.1 Construction

To reduce erosion caused by the higher pool level, Reclamation would not raise the level of the reservoir until all proposed shoreline protection measures are in place. During construction, Reclamation would minimize the potential for erosion by implementing the following BMPs and other techniques:

- Prepare and implement a temporary erosion and sedimentation control plan for construction activities
- Time construction activities to avoid earth disturbance during periods of high precipitation
- Use straw bales, silt fencing, or other suitable sedimentation control or containment devices when shoreline protection measures are constructed
- Cover exposed soil stockpiles, rock stockpiles, and exposed slopes
- Retain vegetation in construction areas where possible
- Seed or plant exposed areas with appropriate native vegetation as soon as possible after work is completed

4.3.8.2 Operation

Reclamation expects the installed shoreline protection measures and mitigation measures to minimize erosion and damage to private land and recreation facilities in protected areas. Reclamation would monitor the areas with the potential for increased erosion as part of its existing annual survey, as described in Section 2.4.3.5. If erosion is identified that would affect private property or infrastructure or increase turbidity in the reservoir beyond acceptable limits, Reclamation would coordinate with the property owners to implement appropriate slope stabilization or erosion control measures.

4.4 Surface Water Quality

4.4.1 Methods and Impact Indicators

This section evaluates the potential for the Cle Elum Pool Raise Project to degrade water quality during construction and operation. Reclamation's assessment of potential water quality impacts on receiving waters is based on existing water quality data and literature, water body characteristics (e.g., reservoir depth, river flow) and anticipated changes to these conditions from the proposed action. The assessment incorporates professional judgment and experience. The area of the analysis includes Cle Elum Reservoir, the Cle Elum River upstream and downstream of the reservoir, and the Yakima River downstream from the confluence with the Cle Elum River.

The impact indicators for water quality are turbidity, increased sedimentation (measured as suspended sediment), temperature, dissolved oxygen (DO), nutrients, total dissolved gas (TDG), pH, and fecal coliform bacteria. Washington State surface water quality standards (Chapter 173-201 WAC) specify limits for numerous water quality parameters. These State standards are used as impact indicators for water quality. The State currently has no surface water standard for suspended sediment or nutrients (nitrogen and phosphorus). Table 4-6 shows water quality impact indicators and criteria for determining impact significance.

Table 4-6. Water Quality Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Turbidity	More than a short-term exceedance of the State standard of a maximum of 5 nephelometric turbidity units over background levels that
Temperature	More than a short-term exceedance of the State standard of <16°C (60.8°F), which is the temperature suitable for aquatic life use for core summer salmonids habitat
Dissolved oxygen	More than a short-term lowering of the dissolved oxygen concentration below the State standard of >9.5 mg/L; for lakes, human actions considered cumulatively may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural conditions
Suspended sediment[1]	Suspended sediments concentrations higher than existing conditions for more than a short-term
Nutrients (nitrogen and phosphorus) and change in trophic state[1]	More than a short-term change in nutrient levels from current water quality conditions or a change in trophic state
Total dissolved gas	An exceedance of the State standard of 110 percent of saturation
pH	An exceedance of the State standard of a range between 6.5 and 8.5 on the pH scale, with a human-caused variation within the above range of less than 0.2 units.
Fecal coliform	An exceedance of the State standard of a geometric mean value of 50 colonies per 100 mL; with not more than 10 percent of all samples (or any single sample when less than 10 sample exist) obtained for calculating the geometric mean value exceeding 100 colonies/100mL

[1]No State water quality standard exists for suspended sediment or nutrients

4.4.2 Summary of Impacts

The No Action Alternative would largely continue existing water quality trends, as described in Section 3.4. Temporary water quality impacts may occur in the Cle Elum Reservoir and downstream in the Cle Elum River from the construction of the interim and permanent fish passage facilities and the YRBWEP Phase II conservation projects. Construction best management practices would be utilized to limit any potential impacts. Reclamation and Ecology (2011b) predict no long term water quality impacts are expected from operations of the fish passage facilities. Long-term water quality conditions would remain largely unchanged from current conditions. Ongoing dispersed recreation on the north end of the reservoir would continue to cause water quality problems.

For Alternatives 2 and 4, the Cle Elum Pool Raise Project would locally increase sediments, turbidity, and nutrients as unprotected shorelines erode into the reservoir. The increased sediment loading would be small and within the range of measured suspended sediment concentrations in the Cle Elum River at the head of the reservoir. A small increase in nutrients would occur along with the increase in sediment loading. However, Cle Elum Reservoir is oligotrophic and the increased nutrient loading would not affect overall water quality or trophic state.

Alternatives 3 and 5 contain the same amount of unprotected shoreline and the increase in sedimentation, turbidity, and nutrients from those shorelines would increase slightly from that described for Alternatives 2 and 4. Alternatives 3 and 5 involve hybrid shoreline protection measures which include biotechnical stabilization techniques such as perched beaches. These measures would have the potential for more sedimentation, turbidity and nutrients as fine-grained material within the perched beach sediments may wash out over the first 10 years after the reservoir level is raised. However, the increases would be small and within the range of measured suspended sediment concentrations in the Cle Elum River at the head of the reservoir.

Peak summer water temperatures would continue to occur throughout the surface layer (epilimnion) where exceedances of State criterion have been recorded during recent temperature monitoring (Section 3.4.3). Reclamation does not expect any of the alternatives to increase epilimnion temperature because the reservoir surface area would increase by only about 1 percent and any temperature change due to solar heating would be minimal. Increases in water temperature below the epilimnion as a result of the increased reservoir pool are not expected. Reclamation would continue to discharge reservoir outflows through the existing outlet located at an invert of elevation 2,110, about 50 to 100 feet below the level of the reservoir during summer in the hypolimnion (dense bottom layer in a thermally-stratified lake) where reservoir water is cool. During years when the additional storage capacity is available, the overlying water depth at the outlet would be greater than under existing conditions. This may cause slightly cooler outflows in the summer as temperatures drop with depth. However, the temperature difference would be small and likely not measureable.

In the reservoir, any potential increases in the heating of the surface layer may translate to decreases in DO, but no more so than under existing conditions. At depth, where the reservoir is well oxygenated, DO concentrations would remain similar to existing conditions.

The project would not alter overall chemical or biological properties of Cle Elum Reservoir and will not alter pH. Flow releases from Cle Elum Dam would be within current operating ranges and no increases in TDG would result. The project would not introduce new long term sources of fecal coliforms to the reservoir and would not affect fecal coliform levels.

Overall, the action alternatives would not affect water quality conditions in Cle Elum Reservoir and in downstream reaches of the Cle Elum and Yakima rivers. No significant adverse impacts to water quality would occur.

4.4.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, current water quality conditions would continue in the reservoir, and the Cle Elum and Yakima rivers. Parameters that currently do not meet water quality standards (e.g., seasonal temperature exceedances) would continue and potentially increase under climate change conditions. Reduced water storage could result in reduced DO concentrations and increased temperatures, as discussed in Section 4.12.3. The No Action Alternative provides minimal flexibility to respond to altered conditions associated with climate change.

Dispersed recreation currently occurs on the north end of the reservoir at Dry Creek, Morgan Creek, French Cabin Creek, and along the upper Cle Elum River near the NF-4308 bridge. This dispersed recreation includes vehicle use and camping which causes erosion of the shoreline and reservoir bed and leaves litter and human waste which degrade water quality of the reservoir. Water quality impacts from dispersed recreation would continue and potentially increase under the No Action Alternative.

None of the projects included in the No Action Alternative would cause more than minor construction related impacts on water quality. Reconstruction of the interim fish passage facility would occur entirely on the existing dam spillway, precluding the possibility of erosion or sedimentation. Impacts from construction of the permanent fish passage facilities both in the Cle Elum Reservoir and downstream in the Cle Elum River are unlikely because construction activities would occur within the dewatered confines of the cofferdams and on the dry lakebed for Cle Elum Reservoir construction activities (Reclamation and Ecology, 2011b). The ongoing fish reintroduction program and operation of the interim and permanent fish passage facilities may slightly increase nutrient levels in the reservoir as salmonids die and decay. This would be a positive impact. Construction and operation of the YRBWEP Phase II conservation projects could cause minor short-term increases in erosion or sedimentation, but no long-term impacts on water quality are anticipated.

4.4.4 Alternative 2 – Additional Storage Capacity for Instream Flow With Rock Shoreline Protection

4.4.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

The radial gate modifications would not cause construction-related water quality impacts. Construction would take place on the existing dam in dry conditions when the reservoir is drawn down, minimizing the potential for pollutants reaching surface water. Short-term impacts on water quality could result from inadvertent release of fuel, oil, or other fluids from construction equipment and from the any storm water runoff or wastewater generated within the construction areas. A spill prevention and response plan would be developed and implemented for the duration of construction. Reclamation would collect and remove construction waste and debris from the work area. Therefore, construction activities would not cause exceedance of water quality standards in the reservoir and no significant impacts on water quality would occur. Additional BMPs would be implemented as required by project permits to minimize potential water quality risks to the reservoir.

Operation

Operation of the modified radial gates would not impact water quality. The modified gates would not alter how Reclamation releases water from the dam. Therefore, the radial gate modifications would not change the temperature of water releases or cause release of pollutants to Cle Elum River or downstream in the Yakima River and no significant impacts on water quality would occur.

Increased Reservoir Pool

Operation

Under Alternative 2, reservoir pool elevation would increase with project operations. This increase in reservoir water volume and surface area has the potential to increase erosion on new shoreline areas exposed to wave action and impact water quality. Localized increases in turbidity could occur, resulting in failure to meet the water quality standard. The same possibility exists for temperature, which might not meet the applicable water quality criterion (16°C or 60.8°F) at all times of the year. Nutrient levels may also increase. These temporary conditions could result in potential inconsistencies with the State antidegradation policy. Additional analysis would be needed at the time of permitting to determine the potential extent and magnitude of these issues, and to identify any needed corrective measures. However, at this time, no significant adverse impacts are predicted as a result of the increased reservoir pool construction or operation. During project permitting, the more detailed project design would be used to further identify any water quality impacts and necessary corrective measures. Project design details are not available at the EIS level; Reclamation would coordinate with Ecology as appropriate during permitting as part of this evaluation.

Turbidity and Suspended Sediment. The Cle Elum Pool Raise Project could increase the sediment load in the reservoir as shorelines erode. Section 4.3.4 describes the potential for increased erosion and is the basis for determining potential sedimentation levels in the reservoir. As the shoreline adjusts to higher pool elevations, shoreline erosion could introduce suspended sediment to the reservoir. Based on Reclamation's evaluation of potential erosion (potential high range approximately 17,000 to 34,000 cy) and the percentage of fine-grained material (approximately 50 percent), the average increase in suspended sediment would be 0.25 to 0.5 mg/L over the next 50 years (Reclamation, 2014c). The assumption is that all of the predicted erosion would occur in the first 50 years of operation of the Cle Elum Pool Raise Project. Reclamation selected the high range of erosion and a 50-year period to provide a conservative (high) estimate of the rate of erosion for the purposes of this FEIS. The increase is small relative to current conditions (total suspended solids measured at undetected to 8 mg/L) (EPA, 2014). Episodes of high suspended sediment concentrations would be short-lived as localized increases would dissipate and mix in the reservoir as the shoreline stabilizes.

Localized areas could experience short-term turbidity increases of more than 5 NTU over background (State criterion). Suspended sediments or turbidity could cause conditions where less light is transmitted through the water thereby decreasing the water's transparency. This in turn affects a lake's heat budget and water temperatures (Sullivan et al., 2006) and could increase lake surface temperatures because the light does not penetrate into deeper waters (Hocking and Straskraba, 1999 as referenced in Sullivan et al., 2006). However, the increases would be temporary and not likely to have an impact on overall reservoir water quality or downstream in the Cle Elum or Yakima rivers.

The increased reservoir level would cause only small changes in sediment transport and suspended sediment and nutrient input into the reservoir from the upper Cle Elum River. Peak flows in the upper Cle Elum River transport the most sediment in the winter, when the reservoir is 10 to 100 feet below the full pool elevation of 2,240. An increase in pool elevation of 3 feet would not change the location where sediment is deposited at the Cle Elum River delta at the north end of the reservoir. Sediment would continue to move into the reservoir and deposit below the existing full pool level. The reservoir level increase in the spring would continue to inundate sediments deposited on the delta, allowing the associated nutrients to enter the reservoir. No change in suspended sediment or turbidity from the Cle Elum River upstream of the reservoir would result.

Overall, the project would not cause long-term impacts to Cle Elum Reservoir, the Cle Elum and Yakima rivers from suspended sediments and turbidity.

Water Temperature. The 2007 water quality study of Cle Elum Reservoir measured the warmest temperatures on the surface of the reservoir from 2003 to 2005 as ranging from 18.3°C to 21.2°C (64.9°F to 70.2°F), while the warmest temperature at the outlet to the Cle Elum River measured 19.5°C (67.1°F) in July 2004 (Reclamation, 2007). These temperatures exceed the water quality standard of 16.0°C (60.8°F). During 2005, cooler temperatures occurred and the warmest outlet temperature was 16.4 °C (61.5°F) in August. The low-level reservoir outlet is located at elevation 2,110, which is generally 50 to 100 feet below the surface of the reservoir during summer when warmest temperatures occur.

Dissolved Oxygen. Any potential increases in the heating of the reservoir surface layer may translate to decreases in DO, but Reclamation does not expect impacts beyond what currently occurs. Increases in exceedances of the State criterion are not expected from the increased reservoir pool. Dissolved oxygen concentrations would remain similar to existing conditions at depth, where the reservoir is well oxygenated and no impacts would occur.

Nutrients. After measuring nutrient levels in the water in 2007, Reclamation classified Cle Elum Reservoir as oligotrophic (Reclamation, 2007). This is the most recent study of reservoir water quality and Reclamation considers the information valid since few changes have occurred at the reservoir. Nutrient levels are very low and appear to limit algal growth.

The reservoir may experience slight increases in nutrient levels associated with suspended sediment inputs. Nutrients contributed through shoreline erosion may increase algal production temporarily. However, the change in nutrient concentrations would be small (less than suspended sediment concentrations) and would not change the overall water quality of the reservoir. These increases in sediment would likely occur only until the shorelines stabilize at the higher reservoir pool elevations. Inputs must be sustainable in a continuous or pulsed manner in order to maintain increased productivity in the long term (Wetzel, 1983).

Because the increase in reservoir pool level would not cause a continuous input or loading of nutrients to the reservoir, no long-term impacts would occur to Cle Elum Reservoir from nutrient loading associated with sediments from shoreline erosion.

The project would increase the reservoir pool by 3 feet at full pool and up to 5 feet when the reservoir is drawn down in summer. This proposed increase in pool elevation would translate to a potential increase in reservoir pool surface area of 46 acres (at maximum capacity). This potential increase in pool surface area represents approximately 1 percent of the surface area when compared to existing full pool levels at elevation 2,240. Solar radiation generally provides the greatest source of heat to lakes with some transfer of heat from the air and lake bottom sediments (Wetzel, 1983). Any increase in surface area would increase the volume of water in the epilimnion along the lake fringe. Most light energy is absorbed in the top 2 meters (Wetzel, 1983) and in this reservoir heat absorption would be limited to the surface layer. Peak summer water temperatures would continue to occur throughout the epilimnion where exceedances of State criterion have been recorded during ongoing reservoir monitoring (Section 3.4.3). Because the reservoir surface area would increase by only about 1 percent, any temperature change from solar heating would be minimal. Increases in water temperature below the epilimnion as a result of the increased reservoir pool are not expected. No significant increases in water temperature in Cle Elum Reservoir or in the Cle Elum and Yakima rivers are expected as a result of the 1 percent increase in surface area.

The increase in reservoir depth would not interfere with development of the summer thermocline. This thermocline would likely develop at the same depth as currently occurs. Assuming the thermocline depth remains unchanged, the thickness of the hypolimnion could potentially increase by 3 to 5 feet, with no water quality alteration expected.

Total Dissolved Gas. High concentrations of total dissolved gas (as supersaturation) is a potential threat for fish and aquatic life at falls and below dam spillways and outlets where large amounts of air (gas) can be entrained in the water (Weitkamp, 2008). No changes in dissolved gas concentrations below Cle Elum Dam would occur as a result of increased reservoir pool operations, as the reservoir would be operated within its current range of discharges and conditions for air entrainment would not increase from current conditions. Additional exceedances of the State criterion as a result of the increased reservoir pool operations would not occur.

pH. Reservoir pH is controlled by a combination of biological, chemical, and physical interactions. The pH of water determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of nutrients and heavy metals. Like DO concentrations, pH may change with depth in a lake, due to changes in photosynthesis and other chemical reactions. The vertical distribution of pH is inversely related to the vertical distribution of total inorganic carbon (Wetzel, 1983). Because the project would not alter overall chemical or biological properties of the reservoir, effects on pH resulting in exceedances of the State water quality criteria are not expected as a result of increased reservoir pool operations.

Fecal Coliform Bacteria. Changes in reservoir water volumes or residence time would not raise fecal coliform counts above those that would be present under existing conditions. The proposed project would not introduce new long term sources of fecal coliforms to the reservoir. Reclamation expects fecal coliform counts to remain similar to present conditions and no exceedance of the State surface water quality criteria would occur as a result of increased reservoir pool operations.

4.4.4.2 Additional Storage Capacity for Instream Flow

Operation

The Cle Elum Pool Raise Project would alter streamflow in the Cle Elum and Yakima rivers, with the aim of providing instream flow at times when it is more beneficial for fish. Despite the change in flow from Cle Elum Reservoir, the outlet level of the discharge would remain unchanged, ensuring temperatures and other water quality conditions similar to those under current conditions when the reservoir is filling above elevation 2,240.

Discharge to the Cle Elum River would be routed through the existing spillway gates and low-level outlet. During years when additional storage occurs, the outlet's depth below the water surface would be slightly greater than under existing conditions. This may result in slightly cooler outflows in the summer, although the temperature difference would be small and likely not measureable. When water is not available to fill the additional storage, such as during drought years, reservoir or outlet temperatures would not change.

Five scenarios for release to benefit instream flow are described in Section 2.4.2. For the first scenario of releasing additional flows in winter, the temperature of the additional flow discharged during winter would be close to existing water temperatures. Under existing conditions, the reservoir inversely stratifies (cooler water on top of warmer water) in the winter (Goodwin and Westley, 1967); however, water temperatures throughout the reservoir would be cool during the winter and exceedances of the State standard would not occur.

Scenario 2 would supplement releases in the mid-March through May time period to increase flow during outmigration for smolts and kelts. The temperature of the additional flow would be close to existing temperatures and cool because of the time of year it is released. Scenario 3 would increase summer releases at times when additional flows could improve migration conditions for adult salmon in the lower Yakima River. The temperature of the additional releases would be the same as released for other purposes. This scenario depends on favorable air temperatures to maintain cool river temperatures down to the mouth of the Yakima River. Scenario 4 would carry over storage to maintain higher reservoir levels to aid in smolt outmigration. Release volumes would not change and temperatures may be slightly cooler, but likely not measurably. Scenario 5 would be a combination of Scenarios 2 through 4 and would have similar temperature effects.

Overall, Alternative 2 would not raise water temperatures in the Cle Elum or Yakima rivers more than 0.3°C (0.6°F). River temperatures would continue to meet the State water quality standard of 16°C (60.8°F) for salmonid habitat.

Compared to existing conditions, no changes in outlet water quality are expected in DO, which currently meets the 9.5 mg/L standard (WAC 173-201A) or in nutrient concentrations. Flow rates from the reservoir under Alternative 2 would remain within the range of current conditions (180 cfs in winter during dry years to more than 5,000 cfs during flood operations). The typical minimum release is 220 cfs. Therefore, total dissolved gas at the reservoir outlet would remain similar to existing conditions and no impacts from total dissolved gas would occur. Because flows are expected within the existing background range, no erosion within the Cle Elum or Yakima rivers would be expected and no resulting increases in suspended sediment or resulting turbidity violations would occur. In addition, the additional storage would not impact Cle Elum River nutrient concentrations or fecal coliform counts. The pH levels also would not change as overall chemical and biological properties of the reservoir would not change. Long-term water quality impacts to the Cle Elum or Yakima rivers are not expected from using the additional storage capacity to improve instream flows.

4.4.4.3 Rock Shoreline Protection

Construction

Construction activities could affect water quality if sediments enter the reservoir. Sediment from construction disturbances could temporarily degrade nearby water quality. Reclamation would conduct all construction in dry conditions when the reservoir is drawn down, minimizing the potential for sediments to reach surface water. Five miles of new access roads may be necessary for construction. These roads would be 20 feet wide, graded through existing soil, and surfaced with gravel as needed. The newly exposed areas and vehicular use during construction would have the potential to generate sediment and fine materials. However, Reclamation would enclose the perimeter of these areas in erosion control measures, thereby limiting delivery to area surface waters. Reclamation would return the areas to native vegetation following construction.

Short-term impacts on water quality could also result from inadvertent release of fuel, oil, or other fluids related to construction equipment. Reclamation would implement BMPs to prevent spills. A Spill Prevention, Control, and Countermeasures Plan for the project would include these BMPs. Therefore, construction impacts on receiving surface waters would not occur during project construction.

Operation

Once Reclamation raises the pool elevation and inundates the rock shoreline projects, the higher water levels could erode fine materials disturbed during construction. This could cause minor and temporary localized turbidity. During the initial adjustment period, the State water quality standard for turbidity could be exceeded (i.e., turbidity would increase by greater than 5 NTU over background). This change would be of short duration and limited extent (i.e., nearshore areas). Operation of the project would not generate a chronic source of turbidity or sedimentation in downstream areas because the fine material would settle out quickly. In the long-term, the rock shoreline protection measures would reduce erosion and sediment production in the most erosion- prone areas. In addition, rock shoreline protection measures would not impact reservoir pool water temperatures, DO concentrations, pH, or fecal coliform counts. Long-term water quality impacts as a result of the rock shoreline protection are not expected.

4.4.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts from shoreline protection of saddle dikes and the right dam abutment would be similar to those described for rock shoreline protection (Section 4.4.4.3).

4.4.4.5 Shoreline Protection for Public Lands and Facilities

Impacts from shoreline protection for recreational facilities and access would be similar to those described for rock shoreline protection (Section 4.4.4.3). Wood would be placed to help limit erosion on the west side of the reservoir. Logs would be felled directly into place, or dropped into the pool and floated to their placement locations. Only hand tools would be used for anchoring and placement. No large equipment would be used for locating or securing the large wood. Minimal disturbance of the reservoir bed would occur during large wood placement. This disturbance may cause local and temporary increases in turbidity that result from suspended sediment during placement on the reservoir bed, but the impacts would not be significant. No long-term suspended sediment, turbidity or associated water quality impacts from log placement would occur.

4.4.4.6 Improve Aquatic Habitat at Stream Mouths

Reclamation proposes to place large wood pieces on the reservoir bed at the mouths of Para, Branch, and Two Coves Creeks on the west shore of the reservoir (See Section 2.4.6). The habitat improvements would be accomplished using similar methods to installing shoreline protection on the west side of the reservoir (Section 4.4.4.5). Minimal disturbance of the stream and reservoir beds would occur during large wood placement. This disturbance may cause local and temporary increases in turbidity that result from suspended sediment during placement on the reservoir bed, but the impacts would not be significant. No long-term suspended sediment, turbidity or associated water quality impacts from log placement would occur.

4.4.5 Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection (Preferred Alternative)

4.4.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.4.4.1).

4.4.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.4.4.2).

4.4.5.3 Hybrid Shoreline Protection

Construction

Potential water quality impacts from construction would be similar to those for rock shoreline protection (Section 4.4.4.3). Construction of the perched beach berms would require more earthwork and placement of material adjacent to the reservoir, and possibly disturb more ground during construction. However, all construction work would occur in the dry with erosion control measures in place to minimize runoff and prevent debris from entering the reservoir. Water quality impacts on the reservoir would not occur during construction.

Operation

Once Reclamation raises the pool elevation, fine sediments washing out of material placed to construct the perched beaches and other biotechnical stabilization techniques could temporarily raise turbidity. However, the source of the estimated 215,000 cy of material needed for this alternative is existing reservoir sediments, whose percentage of fine sediment has likely been greatly reduced by 80 years of exposure to wave action and fluctuating reservoir levels. Assuming a fine sediment concentration of 5-to-10 percent, (existing alluvial deposits around the shoreline are at 6 percent) and assuming the fine sediments wash into the reservoir over a 10-year period, the estimated suspended sediment concentration in the reservoir would be 1.5 to 3 mg/L. Reclamation selected a 10-year period for analysis because construction of the shoreline stabilization projects would occur over a 5-year period and inundation and wave action would not affect the perched beaches every year. As described in Section 4.2.4.1, the proposed reservoir elevation would reach elevation 2,243 in about 52 percent of the years. The 10-year period for this sediment input differs from the 50-year period assumed for shoreline erosion. Having been disturbed during construction, the perched beach sediments are likely to lose their fines much more quickly than the existing shorelines subject to erosion, which have already lost much of their easily eroded material.

Combined with expected erosion of the west shoreline (Section 4.3.4.1), the expected increase in average suspended sediment concentrations is 1.8 to 3.5 mg/L in the first decade of operation of the Cle Elum Pool Raise Project. Concentrations would decrease with establishment of armoring layers on the surface layer of sediments placed for perched beaches and other techniques and as vegetation establishes on exposed slopes. The long-term average suspended sediment would be similar to that discussed in Section 4.4.4.1, approximately 0.25 to 0.5 mg/L. Both concentrations are low, falling within the existing range measured in inflow from the Cle Elum River during average flow conditions in the Cle Elum River downstream from Cle Elum Dam.

Nearshore areas would experience the highest concentrations of suspended sediment and turbidity because the proximity to the source of eroded sediments, wind, and wave action would combine to keep sediments in suspension. As the pool level drops, most of the sediment would likely redeposit in deeper areas of the reservoir and not be discharged into the Cle Elum River downstream from Cle Elum Dam. These higher suspended sediment concentrations may translate into increased turbidity during the first 10 years as erosion of the fine sediments occurs, possibly to the point of exceeding State water quality standards. Any exceedances would be short-lived as the areas of localized increased turbidity associated with higher pool elevations diminish over time.

Nutrients associated with higher sediment loading could result in localized areas of increased nutrient concentrations; however, given the reservoir's low productivity and the localized and temporary nature of the sediment-related increases, impacts are not expected.

In the long-term, the shoreline protection measures would reduce erosion and sediment production in the most erosion prone areas. This would also reduce any nutrient loadings associated with these sediments inputs. In addition, shoreline protection measures would not impact reservoir pool water temperatures, DO concentrations, pH, or fecal coliform counts. Therefore, long-term water quality impacts as a result of the hybrid shoreline protection are not expected.

4.4.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.4.4.4).

4.4.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.4.4.5).

4.4.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.4.4.6).

4.4.6 Alternative 4 – Additional Storage Capacity for TWSA with Rock Shoreline Protection

4.4.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.4.4.1).

4.4.6.2 Additional Storage Capacity for TWSA

Operation

The effects on Cle Elum Reservoir and Cle Elum River temperatures from using the additional storage capacity to improve TWSA would be similar to those described for Alternative 2 (Section 4.4.4.2). When the reservoir is filling with additional water in spring, outflow from the reservoir would decrease. There would be no effect on outfall temperature because the reservoir would fill during a time when reservoir temperatures are cool and the proportion of flow retained compared to that released is small. When the stored water is released for additional water supply during summer in drought years (when available), the temperature of outflow from the reservoir would likely not change from existing conditions as the depth at which water is withdrawn from the reservoir would change slightly compared to the overall reservoir depth. The potential increase in stored water (14,600 acre-feet) at the beginning of a drought would still be small (4 percent) compared to the volume of water released from the reservoir in a drought year (approximately 350,000 acre-feet).

Predicted impacts for other water quality parameters would be similar to those described for Alternative 2.

4.4.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.4.4.3).

4.4.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.4.4.4).

4.4.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.4.4.5).

4.4.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.4.4.6).

4.4.7 Alternative 5 – Additional Storage Capacity for TWSA with Hybrid Shoreline Protection

4.4.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.4.4.1).

4.4.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.4.6.2).

4.4.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.4.5.3).

4.4.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.4.4.4).

4.4.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.4.4.5).

4.4.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.4.4.6).

4.4.8 Mitigation Measures

Reclamation would obtain all applicable permits for water quality, including National Pollutant Discharge Elimination System permits, Section 401 permits, and Section 404 permits. During construction, Reclamation would implement BMPs and other techniques to minimize the potential for erosion and turbidity in the reservoir, such as working during low reservoir (dry) conditions and using erosion control measures (e.g., silt fencing) around perimeters of the work areas, access roads, and borrow areas. Section 4.3.8 describes these measures. For Alternatives 4 and 5 (hybrid protection), Reclamation would also use sediments with a low percentage of fine sediments in perched beach construction to minimize the amount of fine sediment subject to wave erosion. Reclamation would place an armoring layer of clean gravel and cobbles over perched beach sediment with higher concentrations of fine-grained material.

Regardless of type, Reclamation expects the installed shoreline protection measures to minimize long-term erosion and damage to private land and recreation facilities. Reclamation would continue to implement its inventory and maintenance of shoreline conditions as described in Section 2.4.3.5. If Reclamation identifies erosion problems or failing shoreline protection measures, the agency would determine the appropriate measures to control the erosion or repair the shoreline protection measures. This would reduce potential for sedimentation and turbidity.

4.5 Groundwater

4.5.1 Methods and Impact Indicators

Reclamation evaluated impacts to groundwater by analyzing the potential for the higher maximum reservoir pool to affect groundwater levels (see additional inundated areas on Figures 2-3 through 2-7). The agency evaluated potential impacts to on-site sewer systems (OSS) and groundwater quality by comparing existing OSS locations with the expected change in the reservoir level. The area of analysis for groundwater impacts is the area immediately around the reservoir where the higher reservoir pool could affect groundwater elevations. Table 4-7 lists groundwater impact indicators and significance criteria.

Table 4-7. Groundwater Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Groundwater contamination from construction spills	Groundwater contamination that cannot be avoided by construction BMPs such that contamination reaches the aquifer
Changes in water levels in nearby wells	Inundation of drinking water wells due to higher reservoir pool that cannot be controlled by existing well equipment
Effects to OSS from higher reservoir level	OSS becomes noncompliant with the horizontal or vertical location requirements of the Kittitas County Department of Health and is not fully mitigated

4.5.2 Summary of Impacts

Construction and operation of fish passage facilities and conservation projects under the No Action Alternative is not anticipated to have impacts on groundwater water levels or OSS in the Cle Elum Reservoir area because the facilities would not affect reservoir or river levels (Reclamation and Ecology, 2011b). During construction, inadvertent spills could affect groundwater quality; however, Reclamation would implement BMPs to prevent spills, so groundwater quality effects are unlikely. The additional projects proposed under the No Action Alternative described in Section 2.3, including ongoing fish introduction and the YRBWEP Phase II project, would not impact drinking water wells or OSS as the construction and operation of the projects would not change the reservoir level. No groundwater contamination from construction would occur because neither project would require construction.

Impacts on groundwater would be similar for each action alternative. No negative effects on water wells or groundwater levels are expected because temporary increases in groundwater levels would not impair the function of wells or decrease yield of the aquifer. However, temporarily higher groundwater levels caused by the higher reservoir pool could negatively affect some OSS by causing them to fall out of compliance with county requirements. During construction, inadvertent spills could decrease water quality.

4.5.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, Reclamation would continue to operate Cle Elum Reservoir as it currently does. Reconstruction of the interim fish passage facility and construction of the new fish passage facility and the YRBWEP Phase II conservation projects could cause spills of petroleum products or other chemicals used in construction and leaks of fuel or fluids from construction equipment. Reclamation would take measures to prevent spills, so groundwater quality impacts are unlikely. No dewatering would be required and the Cle Elum Reservoir level would remain unchanged. Therefore, the construction projects under the No Action Alternative are not anticipated to have impacts on groundwater quality, water levels, or OSS in the Cle Elum Reservoir area (Reclamation and Ecology, 2011b).

The ongoing fish introduction program and the YRBWEP Phase II projects would not impact drinking water wells or OSS as the construction and operations activities would not raise the reservoir pool level. Groundwater contamination would not be an issue as no construction at the reservoir is anticipated under either project. Reclamation does not anticipate any long-term impacts on groundwater from the No Action Alternative since it would maintain the existing reservoir pool elevation and existing operations do not cause negative impacts to groundwater. Conditions would largely continue unchanged (see Section 3.5).

4.5.4 Alternative 2 – Additional Storage Capacity for Instream Flow With Rock Shoreline Protection

4.5.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction to modify the radial gates is not likely to affect groundwater because the work would take place on the existing dam. Possible sources of groundwater contamination associated with construction activities include minor spills of petroleum products or hazardous materials used in construction and leaks of fuel or fluids from construction equipment. These could occur at the dam, along access routes for construction vehicles, and at staging areas. Reclamation would implement BMPs to minimize potential impacts, so it is unlikely that contaminants would reach the aquifer. No dewatering would be required, so construction would not affect groundwater levels. No soil compaction is anticipated because the work would take place on the existing dam and equipment and vehicles would stay on existing roads. No drinking water wells or OSS would be impacted by the radial gate modifications because construction would take place entirely on the existing dam and construction activities would not raise the pool level.

Operation

Operation of the new radial gates would not impact drinking water wells or OSS because they would function in the same way as the existing radial gates and would not be in contact with groundwater.

Increased Reservoir Pool

Operation

The Cle Elum Pool Raise Project would result in a 3-foot increase in the reservoir level during spring and late summer. Groundwater elevation changes in response to the increased pool level would likely be both temporary and cyclical (on an annual basis). The change in groundwater levels would be a function of local geology and the interaction between the reservoir and the groundwater system. The wetted perimeter of the reservoir is in contact with unconsolidated sediments as well as sedimentary and crystalline bedrock. In general, groundwater levels would not be expected to fluctuate more than 3 feet if the reservoir pool elevations increase by 3 feet. In some locations the fluctuation could be less than 3 feet, depending on the permeability of the geologic formation in the area. Reclamation expects maximum fluctuations in groundwater levels in areas of glacial outwash and highly fractured bedrock, which have relatively high permeability and greater hydraulic connection with the reservoir. Conversely, groundwater beneath low permeability materials such as clay and nonfractured bedrock are expected to see minimal elevation change. Deep confined bedrock aquifers would likely show little or no response to the temporary 3-foot rise in the reservoir level since confined aquifers are thought to have poor hydraulic connection to the reservoir.

As noted in Section 3.5.1, few wells near the reservoir appear to have open intervals in shallow formations, and most wells near the reservoir are in deeper formations unlikely to respond to the higher reservoir level. The likelihood that the top of a well would be physically inundated is low, given the estimated well locations and local topography; if inundation were to occur, each well is equipped with a grout surface seal to prevent surface water from entering the borehole and well casing. The project would not have a negative effect on local aquifers or wells because higher water levels would not decrease aquifer yield or impair well performance.

As described in Section 3.5.2, property owners near the reservoir use OSS for wastewater treatment. The newly inundated areas shown on Figures 2-3 through 2-7 are outside the 100-foot horizontal setback requirement for the OSS mandated by the Washington State Department of Health to protect surface water quality. Therefore, the OSS on parcels inundated by the higher reservoir level would remain in compliance with the setback requirement. The Kittitas County Department of Health determines requirements for vertical separation of the OSS and the water table on an individual basis. A higher water table resulting from the Cle Elum Pool Raise Project would reduce the vertical separation between the OSS and the water table. Although the current depth to the water table under each OSS is not known, Table 3-2 indicates the first water-bearing formation is likely much deeper than the OSS. It is therefore unlikely that the project would affect the OSS. Reclamation does not anticipate that higher reservoir levels would have a negative effect on OSS functionality; therefore, the OSS should have no additional effect on groundwater quality because the OSS would continue to function normally with no increased potential for leaching of contaminants to groundwater. Prior to raising the pool level, Reclamation would identify any OSS that the higher pool level could affect and determine the condition of those systems. If the increased reservoir pool would cause OSS to become noncompliant with horizontal or vertical location requirements, Reclamation would coordinate with the property owner and Kittitas County Department of Health to reconstruct, relocate, or modify the OSS.

4.5.4.2 Additional Storage Capacity for Instream Flow

Operation

Release of water from the additional storage capacity water for instream flow could result in temporary but annual fluctuations in groundwater levels adjacent to the river downstream from the dam. Even with these temporary fluctuations, groundwater elevations would remain within the range of normal variability caused by snowmelt, weather events, and dam operations (see Section 3.2.2 for a description of historical reservoir releases). Therefore, Reclamation does not anticipate any negative impact on drinking water wells or OSS.

4.5.4.3 Rock Shoreline Protection

Construction

Rock shoreline protection is not likely to affect groundwater resources. During construction, minor spills or leaking construction equipment could affect groundwater quality, but Reclamation would implement BMPs to minimize potential impacts, so it is unlikely that any contaminants would reach the aquifer. Reclamation expects no effects on groundwater elevations would occur during project construction activities because no dewatering would be required. Construction vehicles and equipment could cause soil compaction; however, no impacts to groundwater quality or recharge rates would be anticipated because the construction activities would be confined to small areas along the reservoir shoreline and construction at any one site would be of short duration. No impacts on drinking water wells or OSS would be anticipated because construction activities would not raise the reservoir pool level.

Operation

Rock shoreline protection would not affect drinking water wells or OSS since the material would not be in contact with groundwater or affect groundwater levels.

4.5.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Impacts would be similar to those described for rock shoreline protection (Section 4.5.4.3).

Operation

Increased freeboard on saddles dikes and the right dam abutment would not affect drinking water wells or OSS since the additional rock shoreline protection material would not be in contact with groundwater or affect groundwater levels.

4.5.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Impacts would be similar to those described for rock shoreline protection (Section 4.5.4.3).

Operation

Shoreline protection for public lands and facilities would not affect drinking water wells or OSS since the shoreline protection material would not be in contact with groundwater or affect groundwater levels.

4.5.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Impacts would be similar to those described for rock shoreline protection (Section 4.5.4.3).

Operation

Improving the aquatic habitat at stream mouths would not affect drinking water wells or OSS since the improvements would not be in contact with groundwater or affect groundwater levels.

4.5.5 Alternative 3 – Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection (Preferred Alternative)

4.5.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.5.4.1).

4.5.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.5.4.2).

4.5.5.3 Hybrid Shoreline Protection

Impacts on groundwater would be the same as Alternative 2 (Section 4.5.4.3).

4.5.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.5.4.4).

4.5.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.5.4.5).

4.5.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.5.4.6).

4.5.6 Alternative 4 – Additional Storage Capacity for TWSA With Rock Shoreline Protection

4.5.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.5.4.1).

4.5.6.2 Additional Storage Capacity for TWSA

Release of stored water to TWSA for instream uses could result in temporary fluctuations in elevation of the groundwater surface adjacent to downstream rivers. Even with these anticipated temporary fluctuations, groundwater elevations would remain within the range of normal variability caused by snowmelt, weather events, and dam operations (see Section 3.2.2 for a description of historical reservoir releases). Negative impacts on groundwater drinking water wells or OSS are not expected.

4.5.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.5.4.3).

4.5.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.5.4.4).

4.5.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.5.4.5).

4.5.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.5.4.6).

4.5.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.5.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.5.4.1).

4.5.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.5.6.2).

4.5.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.5.5.3).

4.5.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.5.4.4).

4.5.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.5.4.5).

4.5.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.5.4.6).

4.5.8 Mitigation Measures

Prior to raising the pool level, Reclamation would identify any OSS that the higher pool level could affect and determine the condition of those systems. If the increased reservoir pool would cause OSS to become noncompliant with horizontal or vertical location requirements, Reclamation would coordinate with the property owner and Kittitas County Department of Health to reconstruct or relocate the OSS.

During construction, Reclamation would prevent or minimize negative effects to groundwater quality from inadvertent spills through use of construction BMPs, such as good housekeeping; proper storage of hazardous materials and petroleum products; and implementation of a Spill Prevention, Control, and Countermeasures Plan. There would be no need for dewatering during any construction activities; therefore, no dewatering mitigation is required.

4.6 Fish

4.6.1 Methods and Impact Indicators

The impact indicators for fish are based on factors that could affect fish and their habitat. The impact area for fish species includes habitats in Cle Elum Reservoir and its tributaries as well as the Cle Elum River and Yakima River downstream from the reservoir. Methods used to conduct evaluations include review of existing literature and available studies and application of best professional judgment.

Table 4-8 summarizes the impact indicators for fish and habitats in reservoir and tributary habitats along with positive and negative significance criteria.

Table 4-8. Fish and Habitat Impact Indicators and Significance Criteria

Impact Indicators	Significance Criteria
Erosion and turbidity	Increased erosion and turbidity levels that exceed State water quality standards and degrade fish habitat
Primary productivity	Changed nutrient levels that substantially reduce the productivity of reservoir and native fish populations
Habitat complexity	Substantially reduced riparian vegetation and in-water structure or other habitat features that simplify habitats and reduce use by native species or specific life history stages (i.e., incubation, rearing, or spawning)
Habitat connectivity	Decreased access between habitats within individual tributaries (i.e., creation of passage barriers) that feed into the Cle Elum Reservoir Decreased access between tributary and reservoir habitats above Cle Elum Dam Decreased access between habitats in the Yakima and Cle Elum rivers downstream of the Cle Elum Reservoir
River flow	River flows that are not similar to the unregulated flows or do not meet instream flow requirements for salmonids

4.6.2 Summary of Impacts

Under the No Action Alternative, existing low-flow conditions during winter and smolt outmigration (April to May) would continue to negatively impact fish in the Cle Elum and Yakima rivers. Completion of the permanent fish passage facilities at Cle Elum Dam would benefit fish by restoring ecological connectivity, biodiversity, and natural production of anadromous salmonids in the Cle Elum watershed upstream from Cle Elum Dam (Reclamation, 2015a; Reclamation and Ecology, 2011b). Completion of the two YRBWEP Phase II conservation projects (Section 2.3.1.4) would contribute incrementally to streamflow improvements for fish in the lower Yakima River.

For all action alternatives, the increased reservoir level would have minor effects on fish species and habitats, some negative and others positive. Higher reservoir levels would temporarily increase erosion-caused turbidity, which would negatively impact fish. At the same time, erosion may also cause temporary increases in nutrients, which would cause short-term increases in primary productivity that would benefit fish. The inundation of shoreline vegetation would also cause a short-term increase in habitat complexity that would benefit reservoir species by providing additional in-water structure. The small increase in reservoir level is not expected to impact beach spawning or reduce habitat connectivity within the reservoir or between the reservoir and tributary habitats.

For Alternatives 2 through 5, construction of the shoreline protection measures would not impact fish because all construction would occur above the level where fish would be expected in the reservoir. Construction would not cause increased erosion or turbidity that would negatively impact fish, because of the localized nature of the increased turbidity near the construction activity. The completed shoreline protection would not adversely impact fish because it would reduce the potential for erosion and turbidity in the reservoir. There would also be minimal opportunity for fish to use protected shoreline habitats since the increases in reservoir pool elevation would be limited to an average of 39 days per year when the additional storage capacity is available.

Under Alternatives 2 and 3, using the additional storage capacity for instream flows would have a positive impact on salmonids and resident species in the Cle Elum River and downstream in the Yakima River. Alternatives 2 and 3 provide five different scenarios for use of the additional storage capacity to benefit fish, particularly Chinook and sockeye salmon, and in the future, reintroduced coho salmon. Under Scenario 1, winter flows would be increased, providing flow and habitat complexity improvements for salmonids in the Cle Elum River downstream from the reservoir. Under Scenario 2, flow conditions would be improved during the smolt outmigration period of mid-March through May. Implementation of Scenario 2 would be subject to accurate estimates of snow pack and predictions of runoff. Under Scenario 3, summer flow pulses would be used to improve habitat connectivity between the lower and upper Yakima River for returning adult spawners. Under Scenario 4, stored water would be used to increase habitat connectivity between the Cle Elum Reservoir and the Cle Elum and Yakima rivers for juvenile salmonids by increasing the length of time during which outmigrating juvenile salmon could use the proposed Cle Elum fish passage facilities. Scenario 5 would represent a combination of the benefits expected under Scenarios 2 through 4. All instream flow scenarios would have positive impacts on fish.

Under Alternatives 4 and 5, Reclamation would use the additional storage capacity for TWSA, resulting in increased summer flows during drought years. Using the additional storage capacity for TWSA would continue the existing low flows that currently impact fish in the Yakima and Cle Elum rivers.

4.6.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, existing low-flow conditions would continue (Section 3.6). Reclamation expects that fish survival and productivity in the Cle Elum River would remain relatively low (Reclamation and Ecology, 2011g). Construction of the conservation projects for the Roza and Sunnyside irrigation districts would contribute incrementally to improved streamflow conditions in the lower Yakima River.

Under Alternative 1, Reclamation expects that kokanee and lake trout populations would gradually decline because of recent changes in fisheries management. WDFW no longer stocks the reservoir with kokanee and encourages anglers to harvest nonnative lake trout. These changes may benefit juvenile sockeye salmon by reducing potential competition for prey with kokanee and reducing predation by lake trout (Johnson and Martinez, 2000). Under Alternative 1, Reclamation expects fishing pressure to remain light in the reservoir, with anglers continuing to harvest kokanee, lake trout, and burbot (WDFW, 2014a).

With continuation of the Yakama Nation's sockeye restoration effort (Section 3.6.2), fisheries managers expect that sockeye populations within the lake would continue to increase. The deposition of marine-derived nutrients from sockeye carcasses is likely to increase nutrient levels within the system and provide direct and indirect sources of food to other trophic levels of the food chain (Willson and Halupka, 1995). This source of biological feedback is usually an important driver of fish populations that exist in otherwise unproductive environments (Schindler et al., 2003).

Reconstruction of the existing interim fish passage facility, which is deteriorating, would maintain downstream passage for sockeye and coho salmon. Completion of the permanent juvenile fish passage facilities at Cle Elum Dam would benefit fish by restoring ecological connectivity, biodiversity, and natural production of anadromous salmonids in the Cle Elum watershed above Cle Elum Dam.

The *Cle Elum Dam Fish Passage and Fish Reintroduction Project FEIS* (Reclamation and Ecology, 2011b) concluded that in the long-term, fishery resources would benefit from permanent fish passage facilities. Valuable habitat upstream of Cle Elum Reservoir would be accessible and available to all species for spawning, rearing, foraging, and migration. While there is the potential for short-term increases in turbidity and sedimentation, it is expected that the use of best management practices related to temporary erosion and sediment control would minimize these impacts. In addition, much of the work would be completed during the dry season, which would minimize the potential for mobilizing disturbed soils and sediment (Reclamation, 2015a).

The proposed new horizontal intake structure would increase the likelihood that juvenile fish will more easily find the inlets because one of the six inlets would always be in contact with the shoreline, which is preferred by the fish. The addition of the splitter wall would prevent releases from the outlet works attracting fish that should be going to the adult fish trapping facility (Reclamation, 2015a).

4.6.4 Alternative 2 – Additional Storage Capacity for Instream Flow with Rock Shoreline Protection

4.6.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Modification of the spillway gates on Cle Elum Dam would occur at the end of irrigation season when the reservoir is drawn down. These modifications would not affect fish because the proposed construction activities would be completely isolated from fish and their habitat. Radial gate construction would not affect water storage or water releases from the dam and thus would not affect fish habitat accessibility, complexity, or function in or downstream of the reservoir.

Operation

The modified spillway gates would be structurally and functionally similar to the existing spillway gates. As a result, Reclamation expects no additional impacts on fish species or habitat. The modified spillway gates would increase the storage capacity of the reservoir and releases of that accrued water could benefit fish as described in Section 4.6.4.2.

Increased Reservoir Pool

Operation

Expected impacts on fish caused by the increased reservoir pool elevation are small in magnitude because the change in reservoir level would be small and proposed operations would be similar to current operations and existing pool fluctuations (Section 3.2.2). The reservoir level currently fluctuates as much as 120 feet during the year and the additional 3 feet of active storage represents only a 3.3 percent increase in operating range over existing conditions. On average, reservoir levels would exceed the baseline elevation 2,240 on June 2 and stay above that level until July 10. The increased reservoir levels are nearly identical to the baseline period of maximum pool elevation (Figure 4-1). Similarly, the expected minimum pool elevation under Alternative 2 would be nearly the same as minimum elevations occurring in the fall and winter under the No Action Alternative.

Increased reservoir elevation would increase erosion along newly exposed shoreline areas (Section 4.2), an effect that would be mitigated by shoreline protection measures (Sections 4.3.4.3 and 4.3.4.5). Erosion also occurs under current conditions (Thomas, 2015). In unprotected areas, increases in erosion would impact littoral habitats, disturbing fish present in these areas. Under Alternative 2, increases in erosion and turbidity would be limited to about 39 days per year on average, during June and early July, and only in years when the reservoir would exceed elevation 2,240. After shoreline protection is in place and loose material has eroded, turbidity levels would decrease, so long-term impacts would not be significant. Higher turbidity could alter normal fish behavior (Berg and Northcote, 1985), reduce the productivity of aquatic ecosystems (Henley et al., 2000), and alter the dynamics of predator-prey relationships among fish species (Gregory and Levings, 1998). Fish species that may be disturbed by temporary, initial increased turbidity include mountain whitefish, cutthroat trout, rainbow trout, eastern brook trout, lake trout, brown trout, longnose dace, leopard dace, speckled dace, chiselmouth, redside shiner, peamouth, northern pikeminnow, largescale sucker, mountain sucker, threespine stickleback, and sculpins (impacts on bull trout are addressed in Section 4.9).

Initial inundation and shoreline erosion in unprotected shoreline areas may also release nutrients within the reservoir and cause a small temporary increase in primary productivity and availability of zooplankton prey for limnetic species such as kokanee and juvenile sockeye salmon (Kimmel, 1990; Hall et al., 1999). However, this temporary minor source of nutrients would not persist after initial inundation and after eroding shorelines stabilize. Therefore, no lasting impacts on limnetic fish species are expected.

The higher reservoir level may alter vegetation along the reservoir shoreline, depending on the tolerance of species to water level fluctuations (Section 4.7). Shifts in riparian community structure would initially cause accumulation of woody debris when trees that are intolerant of intermittent high water die and fall. Submerged vegetation along the inundated shoreline would temporarily increase habitat complexity and foraging opportunities, benefitting some fish in the reservoir (Thornton, 1990). Fish that would potentially benefit include species that utilize littoral habitats such as mountain whitefish, cutthroat trout, rainbow trout, eastern brook trout, brown trout, dace, chiselmouth, redside shiner, peamouth, northern pikeminnow, largescale sucker, mountain sucker, threespine stickleback, and sculpins.

Increased storage would increase accessibility to some new littoral habitats for an average of 39 days typically from early June to early July. Fish attracted to these areas could strand or dewater when the reservoir level drops. However, during fall and winter, the reservoir level would also be higher, preventing dewatering of some existing habitats (Figure 4-1). Because the period and net difference in operational elevation (i.e., peak to minimum reservoir elevation) would be similar to those of the No Action Alternative, there would be no incremental risk of stranding or dewatering. The increased water levels and changed pool operations would not affect beach spawning sockeye redds because spawning occurs during September and October when the reservoir is already at minimum pool elevation. Increased water storage during the minimum pool elevation may slightly increase the availability of beach spawning habitats, particularly at the mouth of the upper Cle Elum River, an area where beach spawning sockeye frequently spawn (Matala et al., 2014).

For other fish species inhabiting Cle Elum Reservoir, the minor changes in inundated shoreline habitat may shift some spawning habitats to new locations within the reservoir, but the higher pool elevations are not expected to substantially reduce the complexity or connectivity of fish habitat compared to existing conditions. For tributaries entering the reservoir, spawning habitat would be the same or slightly increased because the shift in pool elevation would generally increase the depth of water in the reservoir and at tributary mouths. Similar to existing conditions, the highest reservoir elevations would also occur during summer months when runoff rates are lower and sediments are less likely to be mobilized. This minimizes the potential formation of sediment barriers at tributary mouths that could impede fish passage when reservoir levels drop. As described in Section 4.6.8, Reclamation will evaluate the mouths of tributaries following the initial pool raise to confirm that there is no reduced passage.

The expected potential effect of the increased reservoir pool on nonnative salmonids, such as brook trout and lake trout, would be similar to those on other salmonids. The habitat alterations or operational impacts would pose the same risk or benefit to nonnative salmonids as to natives.

In summary, the impacts associated with increased reservoir level would have minor negative and minor positive effects on fish species and habitats. Higher reservoir levels would temporarily increase erosion-causing turbidity over existing conditions which would negatively impact fish species. At the same time, the increased erosion may also temporarily increase nutrients, which would cause short-term increases in productivity that would benefit fish species. Additionally, the inundation of shoreline vegetation would cause a short-term increase in habitat complexity that would benefit reservoir species by providing additional in-water structure. Reclamation does not expect significant changes in habitat connectivity within the reservoir, or between the reservoir and tributaries as a result of the increase in pool elevation.

4.6.4.2 Additional Storage Capacity for Instream Flow

Operation

When available, the additional 14,600 acre-feet of stored water could provide Reclamation with greater flexibility to meet objectives for salmon inhabiting the Cle Elum Reservoir and habitats in Cle Elum and Yakima rivers downstream. The additional storage capacity would be available in about 72 percent of the years modeled and could be used in a number of different ways to benefit salmon. Reclamation has proposed five operational scenarios that represent different options for using stored water to benefit fish (Section 4.2.4.2).

Scenario 1 – Improve Winter Flows

Under this scenario, the additional storage capacity would be released during fall and winter (October to March), providing an additional 36 cfs for 6 months (Section 4.2.4.2). Currently, low-flow condition and lack of flow variation occurs in the fall and winter and limits available habitat complexity by limiting access to important side channel rearing habitats for juvenile fish, particularly Chinook salmon (Reclamation and Ecology, 2011g). Increased fall and winter flows would improve habitat complexity and connectivity by expanding access to side channels for resident fish and anadromous salmonids. These changes would incrementally bring the Cle Elum River closer to unregulated flows during winter and would improve habitat conditions for native fish (Lytle and Poff, 2004). For spring Chinook that spawn from August through October (Sampson et al., 2013), additional fall and winter flows would increase the availability of spawning areas and help ensure that fall redds would not be dewatered in winter. Increased flow during the October-to-March period would also benefit migrating juvenile spring Chinook salmon, sockeye salmon, and potentially coho salmon originating in the upper Yakima and Cle Elum rivers by providing migratory cues and flow variation necessary for outmigration (Reclamation and Ecology, 2012). Flow and habitat complexity improvements would increase the survival and productivity of salmonids in the upper Yakima basin (Reclamation and Ecology, 2011g).

The benefit of improved habitat complexity resulting from fall and winter flows would occur primarily in the Cle Elum River, where low fall and winter flows have been targeted for improvement (Reclamation and Ecology, 2011g). Downstream of the Cle Elum River, Yakima River flows are augmented by other tributaries (Section 4.2.4.2) and the additional 36 cfs provided during fall and winter is not expected to provide a significant benefit to fish.

Scenario 2 – Improve Flow Conditions during Smolt Outmigration Period

Under this scenario, additional storage would not be filled in the mid-March through May outmigration time period so that flows could be increased in the Cle Elum River for outmigrating smolts (Section 4.2.4.2). The increase in flow for the mid-March through May period resulting from this scenario could be used to provide a flow pulse that would provide a significant benefit to outmigrating smolts by creating some flow characteristics that would be more similar to an unregulated river.

Research downstream from Roza Dam indicates that there is a flow-to-survival relationship within the reach, resulting in increased smolt survival with increased flow that is most pronounced at low flow levels and eventually levels off at high flow levels (Hubble, 2015). Biologists have not developed a flow-to-survival relationship for the Cle Elum River, but it is reasonable to assume that a similar relationship exists. Observations at the Chandler Dam juvenile facility also indicate the importance of spring freshets as migratory cues that contribute to increased survival (Thomas, 2015).

The higher spring flows proposed in Scenario 2 are expected to enhance migration cues and improve survival of outmigrating smolts. Improvements in spring flow conditions would apply to existing spring Chinook and sockeye populations as well as coho once they are established (Reclamation and Ecology, 2011g). The benefits of improved flow conditions during smolt outmigration would be limited to the Cle Elum River and would be negligible downstream of the confluence with the Yakima River.

Scenario 3 – Increase Summer Flow in Lower Yakima River

Under Scenario 3, additional storage capacity would be used to create summer flow pulses that would enhance sockeye and summer Chinook passage in the lower Yakima River during July and August (Section 4.2.4.2). Flow pulses coordinated with lower temperatures would trigger the movement of adult sockeye and Chinook through the reach between the Columbia River and Sunnyside Dam (Figure 4-3). The proposed flow pulses (Section 4.2.4.2) would last less than a week, but could double flows in the reach. Under baseline conditions, high water temperatures and low flow conditions restrict passage in this reach (Figure 4-3) (Hubble, 2015). The availability of summer flow pulses could, therefore, provide a significant benefit to sockeye and Chinook salmon by improving habitat connectivity within the lower Yakima River.

Scenario 4 - Carryover for Fish Passage

Under this flow scenario, Reclamation would retain the additional stored water to create a higher reservoir level which would increase the length of time during which outmigrating juvenile salmon could use the proposed Cle Elum fish passage facilities (Section 4.2.4.2). This flow scenario would allow the fish passage facilities to reach the proper operational elevation 2 to 23 days earlier, with an average improvement of 6 days earlier over existing conditions. Increasing the operational duration of the fish passage facilities would benefit reintroduced sockeye salmon as well as spring Chinook and coho salmon once they become established in the reservoir by increasing connectivity between the Cle Elum Reservoir and the downstream Cle Elum and Yakima rivers.

Scenario 5 – Combination of Scenarios 2 through 4

This scenario would represent a combination of impacts that would occur during the summer and spring months as a result of actions proposed in Scenarios 2 through 4 above (described in Section 4.2.4.2). The anticipated benefits include a combination of improved flows during smolt outmigration, improved habitat connectivity for adult salmon in the lower Yakima River, and improved habitat connectivity between Cle Elum Reservoir and the Cle Elum and Yakima rivers. The individual beneficial contribution of each proposed scenario would be lessened by combining them, but multiple fish passage and habitat objectives could be met.

No change or impact to Cle Elum River or Yakima River winter flows would result from this scenario.

4.6.4.3 Rock Shoreline Protection

Construction

Construction activities related to rock shoreline protection would not impact individual fish or fish habitat accessibility, complexity, and function. Construction would occur during the dry period when the reservoir is drawn down. Therefore, fish would not be present near the shoreline construction areas. Construction would require access routes and staging areas adjacent to aquatic habitats. Reclamation would use BMPs to minimize erosion and would restore and revegetate construction areas and access roads following construction.

Operation

Rock shoreline protection has the potential to negatively affect fish by precluding normal hydrogeomorphic processes, limiting the establishment and recruitment of vegetation (Li and Eddleman, 2002), and reducing the availability of complex rearing habitats (Knudsen and Dilley, 1987). Alternatively, riprap may increase the diversity and abundance of invertebrate prey (Schmude et al., 1998) and habitat use by fish (Knudsen and Dilley, 1987). The areas of shoreline protection are small relative to the size of the reservoir (approximately 16 percent of the 20-mile-long reservoir shoreline). The duration of increase in reservoir pool elevation would be limited to about 39 days per year on average. These factors would limit the exposure of fish to the shoreline protection areas; therefore, there would be minimal opportunity for the fish or invertebrates to use protected shoreline habitats and accrue any impacts.

4.6.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Construction activities related to raising the elevation of the saddle dikes and right dam abutment would not impact fish. Reclamation would conduct construction activities in the dry after the reservoir is drawn down, so no fish would be present near construction areas. Reclamation would employ BMPs to control erosion and would revegetate and restore areas following construction.

Operation

Impacts on fish from the completed projects would similar to those described for rock shoreline protection in Section 4.6.4.3.

4.6.4.5 Shoreline Protection for Public Lands and Facilities

Construction

For most construction activities, there would be no impacts on fish from rock shoreline protection and protection of the west shoreline. Construction at Wish Poosh Campground includes extending a culvert at Davis Creek, requiring a temporary diversion of the creek. Construction could cause a short-term increase in turbidity and disconnection between upstream and downstream habitats. These impacts would last for the duration of the construction period, likely 5 to 10 days. These disturbances would temporarily affect resident species that may occupy Davis Creek. If resident fish are present during construction activities, Reclamation would implement BMPs, including removal of fish from the construction zone, to minimize potential negative impacts.

Operation

Impacts on fish from the completed projects would be similar to those described for rock shoreline protection in Section 4.6.4.3.

4.6.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction activities for improving habitat at stream mouths would not significantly impact fish within the reservoir because Reclamation would complete the work when the reservoir is drawn down 40 to 90 feet in elevation below the work area. Reclamation would use BMPs to minimize erosion and would restore and revegetate disturbance caused to staging areas and access points following construction.

Operation

The completed habitat improvements at stream mouths would help increase the habitat complexity of Para, Branch, and Two Coves creeks (Figure 2-10). Large woody debris can be used to increase habitat complexity and contribute to habitat processes that benefit salmonids (Abbe and Montgomery, 1996). The placement of large woody debris at the mouths of these three perennial creeks would improve habitat complexity for resident trout and anadromous salmon by providing cover from predators and flow refugia (Crook and Robertson, 1999).

The habitat improvements are not expected to significantly change habitat conditions for fish within the reservoir because the logs would be placed at the high water level where contact with the reservoir averages 39 days per year as described in Section 4.6.4.3.

4.6.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.6.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.6.4.1).

4.6.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.6.4.2).

4.6.5.3 Hybrid Shoreline Protection

Construction

Construction activities for hybrid shoreline protection would be similar to those proposed for rock shoreline protection under Alternative 2. Construction impacts would be similar to those described in Section 4.6.4.3.

Operation

Impacts would be similar to rock shoreline protection (Section 4.6.4.3). The hybrid bioengineered approaches are expected to be subject to habitat-shaping mechanisms that would eventually allow natural hydrogeomorphic processes and the establishment of vegetation communities while reducing the amount of erosion in the short term (Li and Eddleman, 2002). These natural habitat-forming processes would support the succession and function of typical riparian habitats, providing cover and forage for resident fish species in littoral habitats. However, fish exposure to these areas would be limited as described in Section 4.6.4.3 and no adverse impacts on fish are anticipated.

4.6.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.6.4.4).

4.6.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.6.4.5).

4.6.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.6.4.6).

4.6.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.6.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.6.4.1).

4.6.6.2 Additional Storage Capacity for TWSA

Operation

As part of TWSA, Reclamation would use the additional storage capacity to provide water supply for proratable irrigation districts and occasionally when required to meet Title XII target flows. This would occur when water supply from the additional storage capacity causes TWSA to meet a threshold for increasing target instream flows at Parker gage and Prosser Dam (Section 4.2.6.2). Under Alternative 4, the net quantity of water available from the additional storage capacity would not change from Alternative 2 (Section 4.2.6.3), but in some years more of the water would be used for irrigation. Under this alternative, the average duration of additional inundation would be 40 days instead of 39 days for Alternative 2. The scenarios modeled for this FEIS assume Reclamation would use the additional storage capacity for TWSA. Although water allocated to TWSA could be used for instream flows, assuming that it would be used to supply proratable irrigators represents a “worst-case” for fish scenario in this EIS analysis. In a drought year, slightly increased outflows would occur in the summer (Figure 4-4). At other times, flows would change only when needed to refill the additional storage or to meet a required increase in target flows at Parker gage and Prosser Dam. Increased summer flows would represent a negative impact for fish in the lower Cle Elum or upper Yakima rivers. The flow releases under this alternative would not occur at a time that would benefit spawning or migration for salmonids in the Yakima and Cle Elum rivers. Using the additional storage capacity for TWSA would continue the existing low flows that currently impact fish in the Yakima and Cle Elum rivers.

4.6.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.6.4.3).

4.6.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.6.4.4).

4.6.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.6.4.5).

4.6.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.6.4.6).

4.6.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.6.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.6.4.1).

4.6.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.6.6.2).

4.6.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.6.5.3).

4.6.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.6.4.4).

4.6.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.6.4.5).

4.6.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.6.4.6).

4.6.8 Mitigation Measures

For all proposed construction activities Reclamation would use construction BMPs, such as straw bales, silt fencing, and other methods described in Section 4.3.8, to reduce erosion. Construction would occur when the reservoir is drawn down and fish are not present near the shore. Reclamation would comply with appropriate instream fish work windows to avoid critical periods. Reclamation would restore and revegetate disturbed areas following construction. In-water and near-water construction would comply with applicable permits and approvals.

Reclamation would coordinate with WDFW, the Service, and NMFS to develop a monitoring program to evaluate stranding or dewatering in newly inundated habitat after initially raising the reservoir level. The monitoring program would include evaluating tributary mouths to determine if the higher water level has degraded fish. Reclamation would develop the details of the monitoring program prior to raising the reservoir level. The monitoring program would also include evaluating how the Proposed Action affects habitat downstream in the Cle Elum River. Reclamation would conduct the appropriate environmental review and compliance on the monitoring program when it is developed.

4.7 Vegetation and Wetlands

4.7.1 Methods and Impact Indicators

Reclamation assessed impacts on vegetation and wetlands using multiple sources of information: Service NWI (2013) Geographic Information System (GIS) database, aerial photographic interpretation of upland and riparian vegetation communities using recent imagery from Google Earth (2013) and ESRI (2011), Reclamation's shoreline elevation GIS data, and preliminary results of hydrologic modeling for the Cle Elum Pool Raise Project. Literature regarding effects of water regime changes on vegetation composition and productivity (Cooke and Azous, 1997; Walters et al., 1980; Kercher and Zedler, 2004; Varteapetian and Jackson, 1997) provided the basis for a qualitative evaluation of potential short-term and long-term effects of additional inundation to vegetation communities.

The impact analysis area for vegetation communities, wetlands, USFS Survey and Manage species, sensitive species, and invasive species includes the following areas:

- The existing Cle Elum Reservoir up to elevation 2,240
- Areas encompassed by the proposed maximum pool elevation up to 2,243 feet
- Vegetation adjacent to the increased inundation zone landward of elevation 2,243

- Areas that would be impacted by proposed shoreline protection and other construction activities as described in Chapter 2

A quantitative and qualitative assessment of the amount of wetland area or upland and riparian vegetation area that would be disturbed by the footprint of the shoreline protection measures provided the basis for assessing impacts on vegetation caused by shoreline protection measures.

Estimates of impacts to wetlands and vegetation communities are not based on formal wetland delineations or plant surveys; therefore, the actual extent of impacts to wetlands and vegetation may vary once on-the-ground studies are conducted. Reclamation would delineate, categorize and assess functions of all wetlands and conduct vegetation community and sensitive plant species surveys in the project area during permitting phase for the preferred alternative.

Potential impacts on wetlands and other vegetation communities would result from increased water levels in the reservoir, and shoreline protection activities. Table 4-9 lists vegetation and wetland impact indicators and significance criteria.

Table 4-9. Vegetation and Wetland Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Changes to upland and riparian vegetation	Loss of native vegetation that results in a decrease in extent, connectivity, and integrity of riparian or upland habitat in the watershed that is not fully mitigated Loss of suitable habitat for USFS Survey and Manage plant species that is not fully mitigated Loss of special status individual plants or suitable habitat that is not fully mitigated
Changes to wetlands near the reservoir	Loss of wetland acreage or impairment of wetland functions that is not fully mitigated, or that results in a net loss of wetlands in the watershed

4.7.2 Summary of Impacts

Projects proposed under the No Action Alternative would not result in significant impacts to wetlands or vegetation because any unavoidable wetland impacts would be fully mitigated and the scale of permanent impacts to vegetation communities is small relative to the overall watershed. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial degradation of vegetation in those areas.

Alternatives 2 through 5 would increase the reservoir pool elevation by up to 3 feet in some years, which is not anticipated to significantly impact wetlands or upland and riparian vegetation. Inundation from the higher reservoir pool may impact USFS Survey and Manage and other special status plant species. Alternatives 2 through 5 would use the same construction and operation activities to increase freeboard at existing dam facilities, and provide shoreline protection measures at recreation facilities, access sites, and private properties, resulting in insignificant impacts to wetlands and vegetation. The rock shoreline protection strategy proposed for private properties for Alternatives 2 and 4 is likely to have a smaller construction footprint than the hybrid shoreline protection strategy proposed for Alternatives 3 and 5; therefore, Alternatives 2 and 4 are likely to result in fewer impacts to wetlands and shoreline vegetation. Reclamation does not anticipate significant impacts to wetlands and vegetation for radial gate modifications, use of additional storage capacity for instream flows or for TWSA.

4.7.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, Reclamation would continue to operate Cle Elum Reservoir as it currently does, and the capacity of the reservoir would not be increased. Ongoing trends may affect vegetation in the Cle Elum watershed and larger tracts of forest land encompassed by the Okanogan-Wenatchee National Forest. These trends include the USFS's ongoing management of public lands under the Snoqualmie Pass Adaptive Management Area (SPAMA) guidance (USFS, 2011a), which aims to restore late-successional forest conditions to the area. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial degradation of vegetation in those areas.

The No Action alternative would not result in significant impacts to wetlands or vegetation. Reconstruction of the interim fish passage facility would not affect wetlands or vegetation because construction would occur on the existing dam spillway and no clearing or grading would be required. Ongoing fish reintroduction at the Cle Elum Reservoir and upper Cle Elum River is expected to benefit the productivity of wetland and upland vegetation communities because of the new influx of nutrients from anadromous salmon carcasses (Reclamation and Ecology, 2011b), maintaining or improving wetland functions and the extent, connectivity and integrity of native vegetation.

Construction of the proposed permanent fish passage facility would not temporarily or permanently impact wetlands because no wetlands have been identified in the project area (Reclamation and Ecology, 2011b; Reclamation, 2015a). Construction of the permanent fish passage facility would impact upland vegetation communities; however, these impacts are not anticipated to be significant. Construction of a the new fish passage facility would temporarily and permanently impact 18.2 acres of land, which primarily consists of disturbed areas adjacent to existing roads and some second-growth coniferous forest (Reclamation, 2015a). Following construction, Reclamation would replant all temporarily disturbed areas with native vegetation, including conifers. These areas would be allowed to mature to a forested condition over a period of 40 to 50 years. Although the permanent fish passage facility would decrease the extent of upland habitat, the overall impact is not anticipated to be significant because the scale of permanent impacts to vegetation communities is small relative to the overall watershed, and thus connectivity and integrity of forested habitat in the immediate Cle Elum watershed would remain intact.

Construction of the two YRBWEP Phase II conservation projects is not anticipated to result in significant impacts to vegetation or wetlands because construction would occur in developed agricultural areas. If any loss of wetland areas occurs, Reclamation would fully mitigate for the impacts.

4.7.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.7.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction to modify existing radial gates would not significantly impact wetlands or vegetation because work would take place in developed areas at the existing dam and spillway, and use existing access roads.

Operation

Operation of the modified spillway gates would not significantly impact wetlands or vegetation because there are no wetlands or vegetation on the dam, and operation and maintenance of the dam would not require activities beyond the footprint of the dam and existing access roads.

Increased Reservoir Pool

Operation

The project would inundate up to 46 additional acres of the Cle Elum Reservoir shoreline at the maximum pool elevation of 2,243 feet. The increase in inundation would only occur in years when sufficient runoff occurs to fill the reservoir above elevation 2,240. Table 4-10 summarizes the approximate acres of additional inundation by wetland and upland or riparian vegetation community type between elevation 2,240 and 2,243. The following impacts assessment assumes that the timing of the increased reservoir pool refill and drawdown would be similar to existing conditions, with peak water surface elevations occurring in June and July (Section 4.2.6).

Table 4-10. Acres of Additional Inundation by Vegetation Community

Wetland/Vegetation type	Area inundated between elevation 2,240 and 2,243 (acres)
Wetland - emergent wetland	2
Wetland - forested/shrub	<0.5
Coniferous forest	30
Deciduous tree/shrub	9
Emergent/herbaceous	<0.5
Bare/developed	4
Total	**46**

Reclamation does not anticipate that the increased reservoir level would cause significant impacts to wetlands because although increased reservoir levels may result in shifts in wetland vegetation composition along the reservoir shoreline, no net loss of wetland acreage or function is anticipated. At the proposed full pool elevation of 2,243, up to 2.5 additional acres of wetland would be seasonally inundated, 2 acres of which consist of emergent wetland vegetation. Increases in water surface elevations during the growing season would create more prolonged and deeper inundation in wetlands that are only exposed to temporary or shallow inundation, which could affect wetland vegetation composition along the reservoir shoreline. Some woody vegetation, such as alder or black cottonwood trees, may succumb to anaerobic stress, causing a change in forested and scrub-shrub wetland composition. However, wetlands around Cle Elum Reservoir have likely developed at the site because of current Cle Elum Reservoir operations, and are already adapted to seasonal inundation during the growing season. More flood-tolerant wetland plants such as spirea, rose, sedges, rushes, and bulrushes, are most likely to withstand additional inundation and may recruit into areas previously vegetated by less flood-tolerant species. The proposed full pool elevation would not directly impact wetland through filling or excavation which might change the capacity of wetlands along the shoreline to perform particular functions, such as storing stormwater, filtering pollutants, protecting stream banks and shorelines, and providing wildlife habitat. As such, no net loss of wetland acreage or function is anticipated with temporary seasonal increases in the increased reservoir pool elevation.

Reclamation does not anticipate that the increased reservoir pool would significantly impact riparian or upland vegetation because the overall impact of seasonal, temporary inundation would not result in a decrease in extent, connectivity, or integrity of native vegetation. The project would temporarily inundate approximately 30 acres of coniferous forest, 9 acres of deciduous trees and shrubs, and less than half an acre of herbaceous vegetation between elevation 2,240 and 2,243. Coniferous species such as Douglas fir, ponderosa pine, and grand fir are generally less tolerant of saturated soil conditions and inundation compared to deciduous trees and shrubs found at the reservoir. As with wetland areas, it is possible that coniferous trees could succumb to anaerobic stress caused by additional flooding, but more flood-tolerant species could recruit into these areas and establish deciduous tree, shrub or emergent vegetation communities, resulting in no overall loss of vegetation.

The increased reservoir pool may also affect vegetation communities that are immediately landward of elevation 2,243. In areas where the elevation gain landward of elevation 2,243 is gradual, such as near the mouth of the Cle Elum River and smaller tributaries, soil may stay saturated for longer durations during the growing season when the pool elevation is above 2,240. However, since these areas are in a landscape position where there is seasonally saturated soil under existing conditions, vegetation communities are already adapted to saturated soil, and thus would be unlikely to succumb to anaerobic stress when the pool elevation is temporarily at elevation 2,243 during some years. Most of the west reservoir shoreline is steep with a more rapid elevation gain landward of elevation 2,243. It is anticipated in these areas that soil would be not be saturated in the root zone for substantially longer periods of time because there is greater soil drainage and vertical distance between the root zones of existing vegetation communities and the water table. The plant associations found in the western hemlock, Pacific silver fir, and mountain hemlock forest cover types occur in regions with higher precipitation (USFS, 1993) and thus are able to withstand seasonally moist soil. Plant species established adjacent to elevation 2,243 that can survive only in very well-drained, dry soil, may be negatively affected by minor changes in soil moisture conditions due to the higher pool elevation; however, other plant species tolerant of variable soil moisture conditions could recruit into these areas.

Although the proposed pool raise may result in shifts in upland vegetation composition, there would not be an overall decrease in extent of upland vegetation around the reservoir. Because the maximum inundated area is less than 50 acres in size, which is a fraction of the over 13,000 acres of relatively undisturbed forests in the Cle Elum watershed (USGS, 2014), the project would have negligible effects on extent and connectivity of forested habitat in the immediate Cle Elum River watershed and in the larger tracts of forest land encompassed by the Okanogan-Wenatchee National Forest.

The increased reservoir pool may impact sensitive species, USFS Survey and Manage species, and special status plant species because prolonged inundation may result in loss of individual plants or suitable habitat. The temporary increase in reservoir level would not likely affect Survey and Manage or special status species whose habitat consists of inundated areas such as wetlands, reservoir, and lake margins because these species would likely be able to adapt to temporary changes in inundation levels. However, increased reservoir levels may affect populations of Oregon goldenaster (State threatened species) that are documented near the mouth of the Cle Elum River. Suitable habitat for this species is dependent on seasonal river flooding to maintain sand and gravel bar substrate, but the plant species itself is not typically found in areas with prolonged inundation or saturated substrate (U.S. Army Corps of Engineers, 2014; Lichvar and Minkin, 2008). Inundation of the 30.1 acres of conifer forests may result in loss of suitable habitat for USFS Survey and Manage and special status plant species found in this type of vegetation community. As such, higher pool elevations may result in anaerobic stress to individual plants, resulting in loss of individual plants, or loss of suitable habitat for USFS Survey and Manage species because of overall shifts in vegetation communities.

The extent of impact on sensitive species, Survey and Manage species, and special status species is not known because surveys for these species have not been conducted in the inundation areas. Reclamation would coordinate with the USFS and Washington Department of Natural Resources to conducted surveys prior to raising the reservoir. If these species are identified in the inundation area, Reclamation would conduct environmental review and compliance on the impacts and coordinate with the USFS and WDNR to avoid or mitigate impacts.

Increased erosion on some shorelines may cause additional trees to fall into the reservoir, but it is difficult to estimate how many. Any tree or other woody vegetation that succumbs to increased inundation may become a snag that could be used for perching, feeding, and nesting, or large woody material that adds protection to the shoreline from wave erosion. For safety reasons, Reclamation proposes to capture the trees that approach the dam. Reclamation would stockpile the trees and make them available for restoration projects.

4.7.4.2 Additional Storage Capacity for Instream Flow

Using additional storage capacity to improve instream flows in the lower Cle Elum River and in downstream reaches of the Yakima River would not significantly impact wetlands or upland and riparian vegetation because changes in flows are not likely to cause loss of wetland acreage or function, nor decrease the extent, connectivity, or integrity of riparian and upland vegetation. The proposal to increase flows from the reservoir during spring and early summer and as needed during the summer is not likely to alter wetland or riparian vegetation communities downstream from Cle Elum Dam because the temporarily increased flows are unlikely to produce prolonged inundation that may cause anaerobic stress to wetland or riparian vegetation communities along the Cle Elum River. Likewise, releasing the water for instream flows outside of the growing season (October to March) is unlikely to affect existing wetlands and riparian vegetation on the Cle Elum River because the temporary increases would occur when plants are dormant and not prone to anaerobic stress. Changes to instream flows are not likely to significantly impact USFS Survey and Manage or other special status plant species because increased flows are not anticipated to be of sufficient volume or duration to cause species to succumb to anaerobic stress.

4.7.4.3 Rock Shoreline Protection

Construction

Rock shoreline protection would involve construction of embankments comprised of rock, rootwad logs, or gabion baskets along existing shoreline banks. After construction, Reclamation would install native vegetation on exposed banks not covered by riprap. Reclamation would use only existing roads, cleared areas, and the dry reservoir bed for staging and access to construction sites (Section 2.4.3.3). It may be necessary to clear the existing roads to approximately 20 feet in width which could impact vegetation and wetlands. Reclamation does not anticipate that construction of rock shoreline protection would significantly impact wetlands along the Cle Elum Reservoir shoreline because unavoidable wetland impacts would be fully mitigated to result in no net loss of wetland acreage or impairment of wetland function. The rock shoreline protection areas would include a total of approximately 21.7 acres of shoreline, portions of which may include patches of vegetated lake fringe wetlands not inventoried in the NWI database. Prior to construction, Reclamation would survey wetlands in the project area and design the shoreline protection measures to avoid or minimize impacts on wetlands. Unavoidable impacts to wetlands would occur if shoreline protection areas are located within or adjacent to wetland boundaries. Direct, permanent impacts on wetlands through filling, excavation, or loss of vegetation would change the capacity of a wetland to perform particular functions, such as storing stormwater, filtering pollutants, protecting stream banks and shorelines, and providing wildlife habitat. Indirect, long-term impacts could occur to wetlands due to construction and operation activities, such as modification of vegetation, partial shading, water quality degradation, and alteration of wetland hydrology sources.

Wetlands permanently impacted by construction activities would comprise a fraction of the over 140 acres of palustrine wetlands mapped along the reservoir shoreline. The proposed construction would not affect large or unique wetland complexes. Reclamation would implement compensatory mitigation for unavoidable wetland impacts (discussed in Section 4.7.8), resulting in an overall effect of no net loss of wetland acreage or function.

Reclamation does not anticipate that rock shoreline protection would significantly impact vegetation because the scale of permanent impacts to vegetation communities (21.7 acres) is small relative to the overall watershed (60,000 acres), and thus connectivity and integrity of forested habitat in the immediate Cle Elum watershed would remain intact.

Reclamation does not anticipate that proposed rock shoreline protection would significantly impact USFS Survey and Manage or other special status species because the areas proposed for shoreline protection adjoin developed areas that are unlikely to provide suitable habitat for these plant species. However, if populations of USFS Survey and Manage and other special status plant species were present in the project area, construction activities could affect them through trampling, removal of individuals, habitat degradation, potential spread and colonization of noxious weeds, or degradation of habitat through erosion and sedimentation. Reclamation would coordinate with the USFS to determine if any sensitive or Survey and Manage or special status species were present in construction areas and would take appropriate steps to minimize impacts on those species.

Operation

Once construction is complete, the shoreline protection areas would not significantly impact wetlands and vegetation because ongoing maintenance would be limited to activities such as irrigation, weeding, spraying, and replacement of plants, as needed, to ensure revegetated areas are established after construction. Reclamation does not anticipate these activities would require additional clearing or grading outside of the rock shoreline protection footprint, and would not result in further loss of wetland acreage and function, or vegetation communities.

4.7.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Construction and acquisition of materials to increase freeboard of saddle dikes and right dam abutment would not significantly impact wetlands because no wetlands are known to be present on the saddle dikes or right dam abutment and the proposed borrow pit areas are located in unvegetated portions of the Cle Elum Reservoir bed (Section 2.4.4).

Construction would not significantly impact vegetation because it would not cause an overall decrease in vegetation extent, or loss of suitable habitat for USFS Survey and Manage species or special-status species. Increasing the freeboard of the saddle dikes and right dam abutment would require construction of a new access road and temporary clearing of some forested areas. Construction at Saddle Dike 1 would require temporary clearing of approximately 0.75 acres of forested area. Construction at Saddle Dikes 2 and 3 would require clearing of approximately 1.6 acres of mostly unforested area. Construction at the right abutment of the dam would require clearing approximately 3.5 acres of forested area. Reclamation would mulch and seed disturbed areas after construction is complete. The proposed action would result in a conversion of forested vegetation communities to grassland; however, there would be no overall loss of vegetation that would decrease the connectivity or integrity of habitat in the watershed.

Operation

Operation of the Cle Elum Pool Raise Project would not impact wetlands or vegetation at the saddle dikes or dam abutment because the areas are currently unvegetated and would continue to be so following construction.

4.7.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Proposed shoreline protection for the Wish Poosh and Cle Elum River Campgrounds, portions of Salmon La Sac Road, and the west shoreline of the Cle Elum Reservoir would not significantly impact wetlands because unavoidable wetland impacts would be fully mitigated. Shoreline protection of the campgrounds and Salmon La Sac Road would require raising and stabilizing existing access roads and recreational facilities most likely to be affected by the increased reservoir level. In addition, a 0.2-acre borrow area and 0.4-acre borrow area would be sited near the Wish Poosh and Cle Elum River Campgrounds, respectively, to provide materials for shoreline protection. Several wetlands are inventoried in the proposed campground shoreline protection and borrow areas. Prior to construction, Reclamation would survey wetlands in the project area and design the shoreline protection measures to avoid or minimize impacts on wetlands. To the extent possible, Reclamation would use existing roads, cleared areas, and the dry reservoir bed for staging and access to construction sites to minimize disturbance to wetlands. Unavoidable temporary and permanent wetland impacts due to clearing, filling and excavating would be similar to impacts associated with rock shoreline protection. Reclamation would implement compensatory mitigation for unavoidable wetland impacts (discussed in Section 4.7.8), resulting in an overall effect of no net loss of wetland acreage or function. The west shoreline and Salmon la Sac protection activities would primarily occur in uplands, and therefore are not anticipated to impact wetlands.

The proposed shoreline protection in these areas would not significantly impact vegetation because it would not result in an overall decrease in vegetation connectivity or integrity, or loss of suitable habitat for USFS Survey and Manage species or special status species. Construction at Wish Poosh Campground would require clearing approximately 1.9 acres of sparsely forested area. Work at the Cle Elum River Campground and borrow area would require clearing 0.7 acres of vegetation. Installing additional riprap along portions of Salmon La Sac Road would require limited clearing because the existing area to be riprapped is mostly unvegetated. Impacts on vegetation communities due to clearing or vegetation removal for Salmon la Sac Road and campground shoreline protection would be similar to those of rock shoreline protection, although the area of vegetation removal (less than 3 acres) would be smaller than that proposed for the rock shoreline (Section 4.7.4.3).

For the west shoreline protection, Reclamation would use existing driftwood, trees and vegetation as stabilization material, and would only use hand tools to acquire and anchor the materials in order to minimize vegetation clearing. Therefore, impacts to vegetation would be negligible.

Shoreline protection at the campgrounds and along Salmon la Sac Road is unlikely to result in significant impacts to USFS Survey and Manage or special status species because these areas are located in developed or sparsely vegetated areas of the reservoir bed, and activities along the west shoreline would avoid and minimize vegetation clearing. Reclamation would coordinate with the USFS to determine if any sensitive or Survey and Manage or special status species were present in construction or pool raise areas and would take appropriate steps to minimize impacts on those species.

Operation

Impacts associated with the completed shoreline protection at recreational facilities, Salmon La Sac Road and west shoreline would be similar to that of rock shoreline protection; therefore, no significant impacts on wetlands or vegetation are anticipated for ongoing maintenance and monitoring activities.

4.7.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Reclamation proposes to improve aquatic habitat at the mouths of three perennial streams on the west side of the reservoir. Reclamation would anchor logs into the reservoir bed at the mouths of Para Creek, Branch Creek, and Two Coves Creek between the existing high water mark and roughly 50 feet below the ordinary high water mark. This action would not use heavy machinery; logs from trees would be felled directly into place, or dropped into the reservoir and floated to their final location. Construction of the aquatic habitat improvements would not significantly impact wetlands because the action would not require permanently clearing, grading or filling wetlands. Construction would not significantly impact vegetation because the loss of a few trees would not result in an overall decrease in connectivity and integrity of upland habitat, nor is it likely to impact USFS Survey and Manage or special status species or habitat.

Operation

Once completed, the aquatic habitat improvements would not significantly impact wetlands or vegetation because the proposed improvements would be passive in nature and therefore not require operation or maintenance activities that may impact wetlands or vegetation.

4.7.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.7.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.7.4.1).

4.7.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.7.4.2).

4.7.5.3 Hybrid Shoreline Protection

Construction

Under the hybrid shoreline protection strategy, Reclamation would protect shorelines using rock walls where needed combined with bioengineered measures such as perched beaches and anchored logs (Section 2.5.3.2). The location of the hybrid shoreline protection areas would be the same as the rock shoreline protections areas (Section 4.7.4.3); however, the hybrid footprint would be greater. Hybrid shoreline protection would cover 30.1 acres of vegetated shoreline, portions of which may include patches of vegetated lake-fringe wetlands not inventoried in the NWI database. Wetland impacts caused by clearing, grading, and filling would be similar to those for rock shoreline protection. These impacts would comprise a fraction of the over 140 acres of palustrine wetlands mapped along the reservoir shoreline. Prior to construction, Reclamation would survey wetlands in the project area and design the shoreline protection measures to avoid or minimize impacts on wetlands. Unavoidable impacts to wetlands would occur if shoreline protection areas are located within or adjacent to wetland boundaries. Reclamation would implement compensatory mitigation for unavoidable wetland impacts (discussed in Section 4.7.8), resulting in an overall effect of no net loss of wetlands.

The proposed hybrid shoreline protection activities would also permanently impact vegetation areas such as coniferous or deciduous trees and shrubs. Reclamation does not anticipate that hybrid shoreline protection would significantly impact vegetation because the scale of permanent impacts to vegetation communities (30.1 acres) is small relative to the overall watershed (60,000 acres); therefore, the connectivity and integrity of forested habitat in the immediate Cle Elum watershed would remain intact.

Some of the hybrid techniques require the use of logs, which Reclamation would salvage from the reservoir and from construction-related clearing of shoreline areas. Reclamation anticipates that its existing stockpile of logs from all the Yakima Project reservoirs would be adequate for the Cle Elum Reservoir shoreline protection measures. If the stockpile is not adequate or if the stockpiled logs do not meet engineering standards, Reclamation would acquire additional logs. Impacts on offsite wetlands and vegetation from obtaining materials (other than logs) outside of the project area may be similar impacts to those of rock shoreline protection if the same sources of the materials are used.

Operation

Once completed, hybrid shoreline protection would not impact vegetation or wetlands because ongoing maintenance would be limited to activities such as irrigation, weeding, spraying, and replacement of plants, as needed, to ensure the establishment of revegetated areas after construction. Reclamation does not anticipate these activities to require additional clearing or grading outside of the hybrid shoreline protection footprint. Vegetation is likely to reestablish on some types of hybrid shoreline protection.

4.7.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.7.4.4).

4.7.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.7.4.5).

4.7.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.7.4.6).

4.7.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.7.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.7.4.1).

4.7.6.2 Additional Storage Capacity for TWSA

Using the additional storage capacity for TWSA would not significantly impact wetlands or vegetation. Potential scenarios for filling the reservoir and releasing the accrued water would not create fluctuations in water levels that are substantially different than those that have been experienced historically. Thus, annual operation of the Cle Elum Reservoir would not result in a loss of wetland acreage and function or extent, connectivity, or integrity of vegetation communities. Impacts on wetlands and vegetation from using the additional storage capacity for TWSA would be similar to those described for using the additional storage capacity for instream flows (Section 4.7.4.2), although changes in TWSA flows over baseline flows would occur less frequently.

4.7.6.3 Rock Shoreline Protection

Impacts from Rock Shoreline Protection would be the same as for Alternative 2 (Section 4.7.4.3).

4.7.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.7.4.4).

4.7.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.7.4.5).

4.7.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.7.4.6).

4.7.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.7.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.7.4.1).

4.7.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.7.6.2).

4.7.7.3 Hybrid Shoreline Protection

Impacts from Hybrid Shoreline Protection would be the same as for Alternative 3 (Section 4.7.5.3).

4.7.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.7.4.4).

4.7.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.7.4.5).

4.7.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.7.4.6).

4.7.8 Mitigation Measures

Prior to construction in areas where any type of ground disturbance is proposed, Reclamation would conduct wetland surveys using current wetland delineation methodology accepted by Federal, State, and local agencies. Reclamation would avoid construction in wetlands to the extent feasible and if any wetland impacts are unavoidable, Reclamation would comply with mitigation measures as established in permit conditions from applicable agencies. Reclamation would work with the Corps as well as State and local agencies to determine whether the proposed additional inundation would result in a loss of wetlands that requires permit approval. Mitigation measures, if necessary, would be developed and implemented to meet agency permit conditions for any wetland impacts caused by the Proposed Action. Reclamation would obtain all applicable permits, including Section 401 and Section 404 permits.

The design of shoreline protection would minimize the need for vegetation removal to the extent possible. Reclamation would locate facilities, access roads, and staging areas in areas where vegetation has already been disturbed or on the reservoir bed to the extent possible. Reclamation would replant disturbed areas with native vegetation where replanting did not interfere with the function of shoreline protection measures. Reclamation would comply with required mitigation for the loss of vegetation.

Reclamation would coordinate with the USFS and DNR and conduct surveys to determine the presence of any sensitive, Survey and Manage, or special status species in the construction or inundation areas. Reclamation would coordinate with the agencies to avoid or minimize impacts to these species and develop appropriate mitigation for unavoidable impacts.

Reclamation would assess the areas where shoreline protection would be installed to identify any invasive species or undesirable vegetation present in the area. If present, Reclamation would suppress this vegetation prior to ground disturbance. Reclamation would monitor for infestations of invasive plant species associated with project-related ground disturbance. If present, Reclamation would implement suppression strategies to control invasive plant populations. These strategies could entail mechanical, chemical, and biological controls. Reclamation would evaluate strategies to reduce environmental risks associated with such controls and ensure compliance with Federal, State, and local laws and requirements and would comply with the requirements under EO 13423 Strengthening Federal Environmental, Energy, and Transportation Management to incorporate integrated pest management concepts.

4.8 Wildlife

4.8.1 Methods and Impact Indicators

Reclamation identified potential impacts on wildlife and wildlife habitat by evaluating wildlife habitats that would be inundated or disturbed by the higher reservoir level, proposed rock or hybrid shoreline protection, and shoreline protection at public facilities. Reclamation identified types of construction activities that might disturb wildlife in the reservoir area, conducted a literature review to determine the species likely to be located in the area, and analyzed the area of inundation using aerial photographs to determine the types of habitats in the affected area. Multiple sources of information were used, including: WDFW Priority Habitats and Species Service database, previous reports (Service, 1997), aerial photographic interpretation of wildlife habitats using recent imagery from Google Earth (2013) and ESRI (2011), Reclamation's shoreline elevation GIS data, and preliminary results of hydrologic modeling for the Cle Elum Pool Raise Project. Section 3.8 describes the WDFW priority wildlife species that have documented occurrences in, or have the potential to migrate through, the area of impact analysis, which include: Canada lynx, elk, fisher, gray wolf, great gray owl, grizzly bear, Larch mountain salamander, northwest white-tailed deer, marten, mountain goat, tailed frog, northern goshawk, bald eagle, northern spotted owl, wolverine. Federally listed species are discussed separately in Section 4.9, including Canada lynx, gray wolf, grizzly bear, and northern spotted owl.

The impact analysis area for wildlife and wildlife habitat includes the following:

- The existing Cle Elum Reservoir up to elevation 2,240
- Areas encompassed by the proposed maximum pool elevation up to 2,243
- Wildlife habitat adjacent to the inundation zone landward of elevation 2,243

- Areas that would be impacted by proposed shoreline protection and other construction activities as described in Chapter 2
- Areas around the reservoir that would experience increased noise or traffic associated with construction

A quantitative assessment of the amount of vegetation that would be inundated or disturbed by the footprint of the shoreline protection measures is provided in Section 4.7. The assessment separates the acres of inundation and disturbance by vegetation community and provided the basis for assessing impacts on wildlife. The vegetation communities include: emergent wetland, forested/shrub wetland, coniferous forest, deciduous tree/shrub, and emergent/herbaceous (Table 4-10). The most common community that would be impacted by the proposed project is coniferous forest. For the purposes of this analysis, the use of the term wildlife habitat refers to coniferous forest and not to other vegetation community types unless specifically mentioned.

Potential impacts on wildlife using coniferous forest habitats along the shoreline would result from increased water levels in the reservoir and shoreline protection activities. Potential impacts to the WDFW priority species mentioned above include: loss or degradation of habitats used by the species from clearing or grading activities associated with the project; alteration of shoreline habitat resulting from additional inundation when the reservoir level is increased; a decrease in landscape connectivity resulting from the loss or degradation of habitats from clearing or grading or additional inundation; the disturbance to wildlife species in the vicinity from construction noise or activities; and the disturbance to wildlife species from project operation. Table 4-11 lists wildlife impact indicators and significance criteria.

Table 4-11. Wildlife Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Loss or degradation of habitat for WDFW priority species	A reduction of habitat quality or quality sufficient to impact the breeding, rearing, and foraging of WDFW priority species
Alteration of shoreline habitat (coniferous forest)	Loss of shoreline habitat’s ability to support breeding and rearing activities of WDFW priority species
Decreased landscape connectivity	Permanent habitat alterations with the potential to disrupt or disturb wildlife movement constitutes an adverse impact. Temporary habitat alterations with the potential to disrupt or disturb wildlife movement constitutes a minor impact
Disturbance of wildlife species in the vicinity from construction noise or activities	Injury, death, or harassment of sufficient magnitude to reduce of WDFW priority species populations
Disturbance of wildlife species from increased noise levels and human activity associated with project operation	Injury, death, or harassment of sufficient magnitude to reduce WDFW priority species populations

4.8.2 Summary of Impacts

The No Action Alternative would result in the continuation of patterns and trends of wildlife habitation that currently occur. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial degradation of wildlife habitat and disturbance to wildlife in those areas. Construction of the two YRBWEP Phase II conservation projects would not impact wildlife. Reconstruction of the existing interim fish passage facilities and construction of permanent fish passage facilities at the dam would generate noise that would affect wildlife in the vicinity. However, the completed interim and permanent fish passage facilities would improve overall primary productivity in the reservoir by allowing anadromous fish to access the reservoir. This would ultimately benefit wildlife including WDFW priority species because of the new influx of nutrients from anadromous salmon carcasses (Reclamation and Ecology, 2011b).

Alternatives 2 through 5 would increase the maximum reservoir pool elevation by 3 feet, and result in comparable types and extents of disturbance to wildlife during construction and changes to wildlife habitats. Construction of the radial gate modifications would cause short-term disturbance to wildlife using open water and habitats along the shoreline near the existing spillway, but the impact of the disturbance is expected to be minor due to the lack of suitable habitat for WDFW priority species and because wildlife would likely return to previous habitat after the construction period. Operation of the increased reservoir levels would inundate a small amount (3 percent of the reservoir) of shoreline habitat that is not affected by current reservoir operations, but this inundation is not expected to result in a significant impact to the breeding and rearing activities of WDFW priority species because of the small spatial extent of habitat, the brief period of time that the habitat would be inundated, and the availability of nearby similar habitat.

Under all four action alternatives, Reclamation would implement the same projects to increase freeboard at existing dam facilities and to provide shoreline protection measures at recreation facilities and access sites, resulting in the same amount of construction noise and activity in the vicinity of the projects and permanent impacts on wildlife habitat. Construction of these projects would cause short-term disturbance to wildlife using habitats in the vicinity, but the impact is expected to be minor because construction would occur after the breeding season for most bird species and because some of the areas have been previously disturbed and do not contain wildlife habitat. Operation of the shoreline protection projects will result in the loss of a narrow strip of conifer forest and deciduous shrub habitat along the approximately 2 miles of the shoreline. This loss of habitat is considered minor because such a small amount would not be sufficient to impact the breeding, rearing, or foraging activities of WDFW priority species and their ability to disperse or migrate to nearby similar habitat.

The rock shoreline protection strategy proposed under Alternatives 2 and 4 is likely to have a smaller construction footprint than the hybrid shoreline protection strategy proposed for Alternatives 3 and 5; thus, Alternatives 2 and 4 are likely to result in smaller changes to shoreline habitats. Hybrid shoreline protection may have a beneficial long-term effect on wildlife that use the reservoir shoreline because it would provide foraging, resting, and shelter for waterfowl, reptiles, amphibians, and small mammals. The proposed aquatic improvements at stream mouths would enhance habitat for fish and ultimately benefit wildlife through increased primary productivity and food sources for some species. Reclamation does not anticipate permanent changes to wildlife habitat for radial gate modifications, use of additional storage capacity for instream flows or for TWSA.

4.8.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, Reclamation would continue to operate Cle Elum Reservoir as it currently does, including ongoing reservoir operation and maintenance activities. Reclamation would also reconstruct the existing interim juvenile fish passage facilities, construct the new permanent fish passage facilities, and construct two conservation projects as part of the YRBWEP Phase II Program.

The No Action Alternative would not result in significant impacts to wildlife or wildlife habitat because there would be no loss or degradation of habitat for WDFW priority species, disturbance to those species, or decreased landscape connectivity as a result of the various ongoing operations. Current trends in wildlife habitation and use would continue over the long term. Conditions would remain similar to those at present. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial degradation of wildlife habitat and disturbance to wildlife in those areas.

Reconstruction of the interim fish passage facility would not affect wildlife habitat because no clearing or grading would be required. Construction of the two YRBWEP Phase II conservation projects would not affect wildlife because the projects are located in developed agricultural areas and no wildlife habitat would be affected. Ongoing fish reintroduction at the Cle Elum Reservoir and upper Cle Elum River is expected to improve overall primary productivity because of the new influx of nutrients from anadromous salmon carcasses (Reclamation and Ecology, 2011b), thus increasing food sources for some species.

Construction of the permanent fish passage facility would cause minor amounts of temporary and permanent impacts to 18.2 acres of riparian and second-growth coniferous forest (Reclamation, 2015a). Following construction, Reclamation would replant all temporarily disturbed areas with native vegetation, including conifers. These areas would mature to a forested condition in 40 to 50 years. Although the permanent fish passage facility would result in a decrease the extent of upland habitat, the overall impact is not anticipated to be significant because the scale of permanent impacts to vegetation communities is small relative to the overall watershed, and thus connectivity and integrity of forested habitat in the immediate Cle Elum watershed would remain intact (Section 4.7.1.3).

4.8.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.8.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction to modify the existing spillway radial gates would result in increased noise and human activity for approximately 6 to 9 months in the area surrounding the dam spillway gates. Noise from sandblasting the existing radial gates, and bolting and welding the gate extensions may result in short-term disturbance to wildlife using habitats in the immediate vicinity of the dam, which are of marginal quality. Wildlife using open water and habitats along the shoreline, such as waterfowl and songbirds, may move to adjacent suitable habitats when disturbed by construction-related noise and human activity. Species most sensitive to disturbance include waterfowl that nest along the shoreline (such as ducks, Canada geese, and common loon). Suitable habitat is available, although competition for food and other resources would increase between displaced individuals and wildlife already using those habitats. Reclamation does not expect significant impacts to wildlife because any WDFW priority species, if present, would likely return to previous habitats after the construction period and would not be disturbed at a magnitude sufficient to reduce species population.

Operation

Operation of the new radial gates would not affect wildlife because relative to existing conditions there would be no additional noise or changes that would disturb WDFW priority species using habitats in the vicinity.

Increased Reservoir Pool

Operation

The pool raise would impact wildlife habitat through inundation. Long-term impacts could occur where foraging habitat or nesting sites for waterfowl or burrowing wildlife is present along currently undisturbed portions of the shoreline. Approximately 46 acres of terrestrial habitat along the shoreline would be flooded for about 40 days in June and early July. The additional inundated area represents a small portion of the approximately 7-mile-long reservoir. The reservoir currently fluctuates by as much as 120 feet each year and the additional 3 feet would cause a small increase in inundated area, estimated to be approximately 3 percent. The additional inundation would occur only in years with sufficient runoff or 72 percent of years as modeled (Section 4.2.6). Impacts would occur along a relatively narrow strip of shoreline, and some of the affected areas do not contain vegetation or provide wildlife habitat. Improved habitat for perching and roosting birds and cavity nesters could result when inundations causes formerly live trees to become snags.

Among the wildlife species that would be affected (effectively displaced) by the additional inundation are burrowing mammals (such as voles and muskrat) and ground-nesting bird species. No WDFW priority burrowing mammals or ground-nesting bird species are documented or likely to occur in the area. Two priority-listed amphibians, tailed frog and Larch mountain salamander, would likely not be affected by the additional inundation because they likely do not use the shoreline habitats that would be affected. Tailed frogs have a strong preference for cold, rocky, mountain streams and are not found in lakes (Leonard et al., 1993). Larch mountain salamander is an exclusively terrestrial species that is not associated with water, but rather rock fields such as talus or lava rock rubble (Crisafulli et al., 2008). The Service has identified suitable habitat in the Cle Elum watershed, but it does not occur along the shoreline (Service, 1997). The area most likely to be affected by the 3-foot raise in pool elevation is the delta at the north end of the reservoir where the upper Cle Elum River discharges into the reservoir. However, the conditions in this additional inundation area are not suitable for burrowing, as it is a sediment deposition area comprised primarily of cobble, gravels, and sand. As stated in Section 3.3, consolidated soil around the perimeter of the reservoir is somewhat resistant to erosion, which would indicate that the area is unsuitable for burrowing. Therefore, Reclamation expects no significant impacts on burrowing animals.

Several ground-nesting bird species are known to breed adjacent to Cle Elum Reservoir, including Canada goose, ruffed grouse, mallard, and mergansers; other species likely to breed in the vicinity include killdeer and spotted sandpiper (Service, 1997; Opperman, 2003). None of these species are considered priority listed species by WDFW. The increased reservoir level could inundate ground nests in the area, causing direct loss of eggs. Individuals would expend additional energy if breeding pairs have to seek out new nest sites and lay an additional clutch. (Some species are capable of laying more than one clutch per year if the first clutch does not survive.) The period of additional inundation would overlap most of the incubation periods for the species identified in the area. Based on the extent and availability of suitable habitat in the delta area at the north end of the reservoir and other shoreline areas, Reclamation does not expect substantial impacts on ground-nesting bird species.

Breeding species in the area that do not nest on the ground include resident and neotropical migrant species such as bald eagle, dusky flycatcher, dark-eyed junco, American robin, Clark’s nutcracker, barn swallow, cliff swallow, hairy woodpecker, yellow, Wilson’s and McGillivray’s warblers, and white-crowned sparrow (Service, 1997; Opperman et al., 2006). Priority bird species that nest or migrate through the area include northern goshawk, great gray owl, and bald eagle. With the inundation of new areas, some trees, particularly conifers, may die with prolonged exposure to water. This could result in some loss of breeding habitat over the long-term. The density of tree species more tolerant of inundation, such as most willow species and black cottonwood, may increase in the future and improve breeding conditions for some species.

In summary, Reclamation does not expect the increased reservoir levels would result in a loss of the inundated shoreline habitat’s ability to support breeding and rearing activities of WDFW priority species such as northern goshawk, great gray owl, or bald eagle because of the small spatial extent of the habitat affected by the inundation, the short length of time that the habitat would inundated, and the availability of nearby similar habitat. The higher reservoir would inundate a small portion of the available shoreline area for less than 2 months, in approximately 72 percent of years. In addition, the habitat value of area to priority species that would be inundated is limited by the lack of vegetation and the changing water levels associated with current reservoir fluctuations. Significant changes in tree species are not expected, but trees that might die because of flooding could benefit species that nest or roost in snags.

4.8.4.2 Additional Storage Capacity for Instream Flow

Operation

Use of the additional storage capacity for instream flows would not impact wildlife or wildlife habitat in the Cle Elum or Yakima rivers downstream from the reservoir. The changes in flow would be small relative to existing river flows. Potential scenarios for filling the reservoir and releasing the accrued water would not create fluctuations in water levels that are substantially different than those that have been experienced historically (Section 4.2.4.2). Therefore, annual operation of Cle Elum Reservoir to improve instream flows would have no effect on breeding, rearing, or foraging activities of WDFW priority species at the reservoir, in Cle Elum River downstream from the dam, or the Yakima River. Therefore, no significant impacts to wildlife would occur.

4.8.4.3 Rock Shoreline Protection

Construction

Construction of the rock shoreline protection would result in increased noise and human activity in the construction areas for approximately 2 months during each construction year. Construction would occur in the late summer and early fall when the reservoir is drawn down for approximately 5 years. Noise from mechanized equipment used for excavation, grading, and placement of material may disturb wildlife using habitats in the immediate vicinity. Traffic noise and human activity would increase at each shoreline protection construction site where trucks deliver material. Wildlife using open water and habitats along the shoreline and near construction access roads may move temporarily to adjacent suitable habitats. However, most of the locations proposed for shoreline protection are in developed areas of limited wildlife habitat value, and construction would not take place during the waterfowl or songbird nesting season when species are more vulnerable to disturbance. Displacement would occur only during periods of elevated noise and human activity associated with construction. Wildlife would continue to use habitats in the vicinity after construction is complete.

Reclamation would install the proposed shoreline protection on both vegetated and unvegetated eroded banks of the reservoir. The identified shoreline protection measures would impact forested shoreline area, which would need to be grubbed before construction. Rock, rootwads, or gabion baskets would replace a portion of this area. Reclamation would revegetate the area with native plants. Reclamation has not yet determined the specific locations for access roads and staging areas, but where possible would use existing roads and the dry reservoir bed for staging and access to construction sites. Reclamation would restore the temporary roads and staging areas with native vegetation after construction.

Overall, Reclamation does not expect significant impacts to wildlife because any WDFW priority species, if present, would likely return to previous habitats after the construction period and would not be disturbed at a magnitude sufficient to reduce species population. Construction of each shoreline protection area would occur after the height of the breeding season for most waterfowl and songbird species, which is when they are most vulnerable. In addition, some of the areas proposed for shoreline protection have been previously disturbed and do not contain wildlife habitat. Thus, no direct loss of wildlife habitat would occur in these areas, and few animals would be disturbed.

Operation

The proposed shoreline protection activities may permanently replace wildlife habitats such as areas of conifer forest and deciduous shrub communities with rock embankment. Impacts on wildlife habitat would be limited by the small scale of the shoreline protection projects (approximately 2 miles of the total shoreline) and because most would be located in previously disturbed areas. Reclamation does not expect the permanent loss or alteration of small amounts of previously disturbed habitat would be sufficient to impact the breeding, rearing, or foraging activities of WDFW priority species because of the low likelihood of species presence and of the species ability, if present, to disperse or migrate to other suitable habitats. In addition, the permanent loss or alteration of habitat would not disrupt or disturb wildlife movement to the level of a significant impact because the amount of habitat removal (narrow strip of conifer forest and deciduous shrub habitat along approximately 2 miles of shoreline) is small in relation to the Cle Elum watershed (133,382 acres as cited in USFS, 1996). Priority mammals, such as Canada lynx, elk, northwest white-tailed deer, and gray wolf have large home ranges and high dispersal ability to move within the reservoir watershed. Species with small ranges, such as fisher, marten, and wolverine, would also have the ability to migrate to suitable habitat in the watershed.

4.8.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Raising the saddle dikes and right dam abutment would result in the same type of impacts on wildlife and wildlife habitat as described previously for rock shoreline protection (Section 4.8.4.3). No significant impacts are anticipated to occur because WDFW priority species, if present, would likely return to previous habitats after the construction period and would not be disturbed at a magnitude sufficient to reduce species population. Construction would occur in late summer and early fall when the reservoir is drawn down and would vary in duration depending on the proposed activity. Construction noise and human activity may cause disturbance to wildlife using habitats in the immediate vicinity of the dam and the construction access roads. Wildlife using open water and habitats along the shoreline and near construction access roads would move temporarily to adjacent suitable habitats during periods of elevated noise and human activity. Wildlife would continue to use habitats in the vicinity after construction is complete.

Much of the construction area for shoreline protection is already void of vegetation and provides marginal wildlife habitat. Reclamation would remove some conifer trees and replace them with shoreline protection or clear and replant native species, which would result in new habitat for wildlife (Table 4-12).

Table 4-12. Impacts on Wildlife Habitat Associated with Construction

Shoreline Protection Element	Habitat Impacts (acres)	Impact Type	Duration of Impacts
Saddle Dike 1	0.75 (forested)	Permanent	Less than 2 weeks
Saddle Dikes 2 and 3	1.6 (unforested)	Temporary	2 months
Right Abutment	3.5 (forested)	Permanent	1 month

Where possible, Reclamation would use existing roads and the dry reservoir bed for staging and access to construction sites. Reclamation would expand existing USFS roads for construction access by limited clearing and gravel surfacing.

Operation

The completed project would cause minor long-term impacts because of the loss of forested habitat near the elevated saddle dikes and right dam abutment. The loss of 4.25 acres of forest habitat near the saddle dikes and right dam abutment is less than 1 percent of total forested habitat in the Cle Elum watershed (133,382 acres). Reclamation does not expect the permanent loss or alteration of this amount of habitat would be sufficient to impact the breeding, rearing, or foraging activities of WDFW priority species because of the low likelihood of species presence and of the species ability, if present, to disperse or migrate to other suitable habitats.

4.8.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction of shoreline protection at the three recreation facilities would result in the same type of impacts on wildlife and wildlife habitat as described previously for rock shoreline protection (Section 4.8.4.3). No significant impacts are anticipated to occur because WDFW priority species, if present, would likely return to previous habitats after the construction period and would not be disturbed at a magnitude sufficient to reduce species population. Construction would occur during the recreational off-season (between Labor Day and Memorial Day) when the reservoir is drawn down and the areas closed to the public. The duration of construction at each area would vary in length (Table 4-13). Construction noise and human activity may cause disturbance to wildlife using habitats in the immediate vicinity of the facility and construction access roads. Wildlife using open water and habitats along the shoreline and near construction access roads would move temporarily to adjacent suitable habitats during periods of elevated noise and human activity. Wildlife would continue to use habitats in the vicinity after construction is complete.

Reclamation would remove some areas of coniferous trees and replace them with shoreline protection or clear and replant with native species (Table 4-13).

Table 4-13. Impacts on Wildlife Habitat Associated with Shoreline Protection at Recreation Facilities

Recreation Facility	Habitat Impacted (acres)	Impact Type	Duration of Impact
Wish Poosh Campground	1.9 (sparsely forested)	Permanent	1 month
Cle Elum River Campground	0.7	Temporary	1 week
Salmon La Sac Road embankment	Minimal clearing	Temporary	2 months

To the extent possible, Reclamation would use existing cleared areas in the campgrounds as work areas, and retain and protect existing large trees. In addition, staging and access to construction sites would use existing roads, informal boat ramps, and the dry reservoir bed where possible.

Operation

The shoreline protection measures in these areas would cause minor long-term impacts to wildlife after construction and no significant impacts to WDFW priority species because the decrease in forested habitat would be less than 5 percent of the total available habitat at the Wish Poosh Campground (approximately 50 acres). Reclamation does not expect that this amount of permanent loss of forest habitat would be sufficient to impact the breeding, rearing, or foraging activities of WDFW priority species because of the low likelihood of species presence and of the species ability, if present, to disperse or migrate to other suitable habitats.

4.8.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction of aquatic habitat improvements at stream mouths on the west side of the Cle Elum Reservoir would result in short-term construction noise and increased human activities. Construction noise would be limited because only hand tools would be used. Therefore, temporary impacts to wildlife species would be minor because any WDFW priority species, if present, would likely return to previous habitats after the construction period and would not be disturbed at a magnitude sufficient to reduce species population.

Operation

Similar to rock shoreline protection, no impacts would occur to wildlife or wildlife habitats following construction. Habitat would be improved at the stream mouths.

4.8.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.8.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.8.4.1).

4.8.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.8.4.2).

4.8.5.3 Hybrid Shoreline Protection

Construction

Construction of hybrid shoreline protection would have the same temporary impacts on wildlife during construction (i.e., disturbance and displacement of wildlife in the vicinity) and impacts on wildlife habitat (removal of coniferous trees) as described for rock shoreline protection (Section 4.8.4.3).

Operation

Operation of the soft shoreline protection measures would not affect wildlife because relative to existing conditions there would be no additional noise or changes that would disturb WDFW priority species using habitats in the vicinity. The proposed protection measures may have a beneficial effect on wildlife that use the reservoir shoreline because the selected treatments involve vegetation, logs, and natural topography that would provide foraging, resting, and shelter for waterfowl, reptiles, amphibians, and small mammals.

4.8.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.8.4.4)

4.8.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.8.4.5).

4.8.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.8.4.6).

4.8.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.8.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.8.4.1).

4.8.6.2 Additional Storage Capacity for TWSA

Use of the additional storage capacity for TWSA would not affect wildlife in the reservoir area. Potential scenarios for filling the reservoir and releasing the water for TWSA would not create fluctuations in water levels that are substantially different than those that have been experienced historically. Thus, annual operation of the Cle Elum Reservoir to improve TWSA would have no effect on wildlife at the reservoir, on the Cle Elum River downstream from the dam, or the Yakima River.

4.8.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.8.4.3).

4.8.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.8.4.4).

4.8.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.8.4.5).

4.8.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.8.4.6).

4.8.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.8.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.8.4.1).

4.8.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.8.6.2).

4.8.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.8.4.3).

4.8.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.8.4.4).

4.8.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.8.4.5).

4.8.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.8.4.6).

4.8.8 Mitigation Measures

Reclamation would preserve habitat of significant importance to the greatest extent possible. Prior to construction in areas where coniferous forest would be removed, Reclamation would evaluate the stand of trees and avoid removal of higher value trees and habitat to the extent feasible. Delineated and well-marked clearing boundaries would be established to limit disturbance to habitat. Reclamation would locate facilities, access roads, and staging areas in areas where vegetation has already been disturbed or on the reservoir bed to the extent possible. Reclamation would replant disturbed areas with native vegetation where replanting did not interfere with the function of shoreline protection measures. Reclamation would comply with required mitigation for the loss of coniferous forest through replanting or other enhancement measures.

Reclamation would coordinate with the USFS to determine if any sensitive or Survey and Manage or special status species were present in construction or pool raise areas and would take appropriate steps to minimize impacts on those species.

4.9 Threatened and Endangered Species

4.9.1 Methods and Impact Indicators

Reclamation's analysis of Federal threatened and endangered species included a review of Federal and State databases to determine the presence of species listed under the Endangered Species Act (ESA) likely to be located in the reservoir area and designated critical habitat for those species. The area of impact analysis for threatened and endangered species includes Cle Elum Reservoir; the Cle Elum River upstream and downstream from the reservoir; the Yakima River downstream from the reservoir, and land surrounding the reservoir that could impacted by construction noise, construction traffic, habitat disruption, or project operation. Section 3.9 describes the species federally listed or proposed for listing that potentially occur in the area of impact analysis, which include: bull trout (Columbia River DPS), steelhead (Middle Columbia River DPS, Canada lynx, gray wolf, grizzly bear, marbled murrelet, northern spotted owl, yellow-billed cuckoo, and Ute ladies'-tresses (plant species). Ute ladies'-tresses is not known to be present in Kittitas County and no further consideration is given to effects on this species. The literature review identified the preferred habitat and life cycles of those species and supported an analysis of the effects of additional inundation around the shoreline on those species. Impacts on listed species largely relate to vegetation loss because of the increased reservoir inundation area, altered habitat conditions, soil disturbance, and construction-related noise and human activity. The analysis evaluated potential noise impacts by comparing expected construction noise levels with the thresholds established by the Service for individual ESA-listed species.

An impact on threatened and endangered species would be considered negative if actions taken during either the construction or operation phase of a project were to result in direct harm (injury or death) or harassment to the species or actions that result in alterations of habitat that would limit the ability of that habitat to support the continued existence and ultimate recovery of the species. Negative impacts on threatened and endangered species and some common examples include the following:

- *Any direct loss of habitat that supports a listed species, including habitat occupied during any stage of its life cycle.* For example, removal of trees of a particular size and of tree species that are important for successful breeding of many listed bird species, including the northern spotted owl and marbled murrelet would constitute a negative impact.
- *Any reduction in the functionality of habitat that supports listed species*. For example, if construction results in the potential for erosion (via land disturbance activities such as clearing and grading) and a subsequent increase in sedimentation or turbidity, the resulting degradation in water quality or quality of spawning gravels may reduce the ability of habitats to function normally and thus reduces the ability of the habitat to support threatened and endangered species.
- *Any activity that restricts or prevents threatened or endangered species movements or migration patterns*. This could include construction of physical barriers (culverts and dams) or conduct of activities that may create physiological barriers to migration. Physiological barriers could include activities such as large-scale clearing adjacent to small- and medium-sized streams where riparian vegetation plays a vital role in ameliorating stream temperatures.
- *Any activity that results in direct harm or harassment of a species*. For example, activities that generate excessive underwater noise have been known to result in injury or death to fish as well as marine mammals, and diving birds such as the marbled murrelet.

Impact indicators for listed fish species are the same as described in Table 4-8. Table 4-14 lists impact indicators and significance criteria for ESA listed species other than fish.

Table 4-14. Threatened and Endangered Species Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Impacts to habitat for bull trout or MCR steelhead	Same as impact indicators and significance criteria for fish (Section 4.6)
Disturbance of threatened and endangered species from construction noise or activities	Direct harm (injury or death) or harassment of threatened and endangered species
Disturbance of northern spotted owl from construction noise and activities	Noise levels exceeding injury thresholds year-round and disturbance thresholds during the nesting period would constitute an adverse impact to northern spotted owl[1]. Noise levels exceeding the established disturbance thresholds outside the nesting period, and alert and detectability thresholds year-round, would constitute a minor impact to northern spotted owl.
Loss or degradation of habitat that supports northern spotted owl	Any reduction in area or functionality of habitat suitable for supporting northern spotted owl nesting, foraging, and roosting that is not mitigated would constitute an adverse impact to northern spotted owl. Any reduction in area or functionality of high quality dispersal habitat or a reduction when dispersal habitat is limited would constitute an adverse impact to northern spotted owl. A reduction in area or functionality of low quality dispersal habitat when dispersal habitat is not limited would constitute a minor impact to northern spotted owl.

[1]Established in the biological opinion for the Olympic National Forest Program of Activities.

4.9.2 Summary of Impacts

The No Action Alternative would cause continuation of current conditions, which could result in detrimental long-term impacts to listed species in the Cle Elum and upper Yakima rivers. These detrimental effects are associated with low instream flows for winter incubation and rearing and spring outmigration flows, which would continue to provide limited spawning and migration habitat. Reconstructing the existing interim fish passage facilities and construction of permanent fish passage facilities at the dam would generate noise that would temporarily affect listed species. Continued use of the completed interim juvenile fish passage facility and completion of the permanent passage facilities at Cle Elum Dam would benefit listed fish by restoring ecological connectivity, biodiversity, and natural production of anadromous salmonids in the Cle Elum watershed above Cle Elum Dam (Reclamation, 2015a; Reclamation and Ecology, 2011b). Listed terrestrial species would benefit from the increased primary productivity in the Cle Elum basin. Construction of the two YRBWEP Phase II conservation projects would incrementally improve streamflows in the lower Yakima River and could benefit listed fish species. Ongoing dispersed camping and day use activities near the north end of the reservoir would continue to cause substantial degradation of wildlife habitat suitable for the northern spotted owl.

For Alternatives 2 and 3, the increased reservoir level would have minor effects on bull trout, some negative and others positive. Higher reservoir levels would temporarily increase productivity, but could also increase turbidity. Reclamation expects changes in habitat functionality to be minor. Using the additional storage capacity for instream flows would provide a positive impact for bull trout. Under Alternatives 4 and 5, Reclamation would use the additional stored water for TWSA, resulting in increased summer flows and decreased winter flows. The timing of flow releases under these alternatives would cause a negative impact on listed salmonids in the Yakima and Cle Elum rivers.

Under Alternatives 2 and 3, using the additional storage capacity for instream flows would provide a positive impact for bull trout and MCR steelhead in the Cle Elum River and downstream in the Yakima River. Alternatives 2 and 3 provide five different scenarios by which the additional storage capacity may benefit fish, including bull trout and MCR steelhead. Under Scenario 1, winter flows would be increased, providing flow and habitat complexity improvements for bull trout and steelhead rearing in the Cle Elum River below the reservoir. Under Scenario 2, flow conditions would be improved during the outmigration of steelhead juveniles and kelts. Under Scenario 3, summer flow pulses would be used to improve habitat connectivity between the lower and upper Yakima River for migrating sockeye and Chinook adults. Under Scenario 4, stored water would be used to increase habitat connectivity between the Cle Elum Reservoir and the Cle Elum and Yakima rivers for outmigrating juvenile salmonids by increasing the operational duration of the proposed Cle Elum fish passage facilities. Scenario 5 would represent a combination of the benefits expected under Scenarios 2 through 4. Reclamation expects no impacts on marbled murrelet because the project area is on the far eastern extent of suitable habitat and this species has never been documented in the vicinity. Due to the lack of suitable habitat, construction impacts to northern spotted owl are not expected. The increased pool elevation would result in impacts to spotted owl habitat that would be mitigated.

4.9.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, low winter flows in the Cle Elum and Yakima rivers would continue to provide degraded spawning and migration habitat for bull trout and steelhead (Section 4.6.3), which could contribute to continued declines of these species. Existing conditions for terrestrial listed species would remain similar to existing conditions. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial degradation of wildlife habitat and disturbance to listed species such as northern spotted owl in those areas.

Reconstruction of the existing interim fish passage facility, which is deteriorating, would maintain downstream passage for juvenile sockeye and coho salmon. Completion of the permanent juvenile fish passage facilities at Cle Elum Dam would benefit fish by restoring ecological connectivity, biodiversity, and natural production of anadromous salmonids in the Cle Elum watershed above Cle Elum Dam. Specific construction and operational impacts are described in more detail in Reclamation and Ecology (2011b) and Reclamation (2015a) and are the same for bull trout and MCR steelhead as described for fish in Section 4.6.3.

In 2010, Reclamation completed ESA consultation for the Cle Elum Dam Fish Passage Project with NMFS (NMFS Tracking No. 2010/04694, issued November 22, 2010) for MCR Columbia River steelhead and with the Service for northern spotted owl. The *Cle Elum Dam Fish Passage Facilities Design Summary Update* (Reclamation, 2015a) documents the changes to the permanent fish passage facilities and notes that the NMFS and USFWS concurrence remains unchanged from 2010.

Construction of the two YRBWEP Phase II conservation projects would cause minor, short term increases in erosion and sedimentation. Implementation of the projects would incrementally improve streamflows in the lower Yakima River and could benefit listed fish species.

4.9.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.9.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction to modify the radial gates would cause increased noise and human activity for approximately 6 to 9 months in the area surrounding the dam spillway gates. In general, construction noise would result in disturbance to northern spotted owl and marbled murrelet if birds were within 72 feet of construction activities. However, given the developed nature of the dam's spillway area, the fact that the closest marginally suitable habitat for northern spotted owl is over 800 feet from the spillway construction area, and the fact that no marbled murrelet habitat is present, construction necessary for spillway radial gate modifications would have no adverse impact on northern spotted owl or marbled murrelet. No impacts to habitat supporting either marbled murrelet or northern spotted owl would occur; therefore, Reclamation anticipates no adverse construction-related impacts to these species. Construction of the radial gate modification is unlikely to affect other listed terrestrial species, such as gray wolf, grizzly bear, and Canada lynx, given their small numbers in the project area and their ability to avoid the area during construction (Section 3.9.4).

Construction would also not affect listed fish species because the proposed construction activities would be completely isolated from fish and their habitat.

Operation

Reclamation expects operation of the new radial gates to have no effect on listed terrestrial species because there would be no noise increase, habitat loss or degradation of habitat that supports northern spotted owl or other listed species. The modified spillway gates would be structurally and functionally similar to the existing spillway gates. As a result, Reclamation expects no additional impacts on listed fish species or habitat.

Increased Reservoir Pool

Operation

Inundation of additional areas around the reservoir could affect habitat for bull trout, northern spotted owl, and marbled murrelet as described in detail below. Currently no MCR steelhead are present above Cle Elum Dam, however, the Yakama Nation may reintroduce steelhead in the future. Additional inundation is unlikely to affect terrestrial species, such as gray wolf, grizzly bear, and Canada lynx, given their small numbers in the project area and their ability to avoid the inundation area (Section 3.9.4).

Bull Trout. Bull trout would experience both positive and negative effects from the increased reservoir pool. Potential positive effects include a temporary increase in productivity and habitat complexity resulting from inundation of terrestrial vegetation, organic matter, and soil. This benefit would likely be small and transient, but could increase the availability of nutrients and productivity of an otherwise oligotrophic reservoir. An increase in reservoir productivity would increase the abundance of invertebrates and other bull trout prey species. Potential negative effects include a temporary increase in turbidity from erosion in inundated areas without shoreline protection. Higher turbidity can reduce the productivity of aquatic ecosystems (e.g., Henley et al., 2000) and provide refuge for prey species (Gregory and Levings, 1998). Section 4.6.4.1 provides additional detail on inundation-related changes in productivity and turbidity.

Both positive and negative effects associated with inundation are likely to be small in magnitude because of the relatively small scale of the proposed increase in storage. Reclamation does not expect tributary passage issues with Alternative 2 because proposed reservoir elevations would not result in significant backwatering into streams. Passage issues are typically associated with lowering of reservoir pool elevation and not raising pool elevations; however, Reclamation would evaluate the mouths of tributaries following the initial pool raise to confirm that there is no reduced passage.

MCR Steelhead. Steelhead are currently absent from Cle Elum Reservoir because Cle Elum Dam blocks upstream fish passage. Steelhead reintroduction to Cle Elum Reservoir is expected to occur in the future (Reclamation and Ecology, 2011b). Any steelhead reintroduction above the dam would be done in consultation with NMFS. Potential impacts of the increased reservoir pool are expected to be small in magnitude and similar to those predicted for bull trout and other non-listed salmonids (Section 4.6.4.1). Specifically, rearing steelhead may benefit from a transient increase in productivity and prey availability due to initial inundation of new reservoir habitats, but may also experience negative impacts from increased turbidity (Section 4.9.4.1). Access to rearing and spawning tributaries and other habitats within the reservoir would not change significantly compared to the No Action Alternative (Section 4.6.4.1).

Northern Spotted Owl and Marbled Murrelet. The proposed additional inundation around the perimeter of Cle Elum Reservoir would cause the loss of some vegetation over multiple decades as more flood-tolerant species replace less flood tolerant trees or shrubs. The project would inundate approximately 30 acres of conifer forest and 11 acres of deciduous tree and shrub habitats during June and July of some years, acreages that represent less than 1 percent of the approximate 60,000 acres of forested habitat surrounding the reservoir. These areas support vegetation that may provide foraging, roosting, dispersal, and breeding habitat for northern spotted owls. Approximately 27 acres of the 42 additional acres that would be inundated is currently designated critical habitat for northern spotted owl. This area is located along the west and north sides of the reservoir, with a few small slivers adjacent to the east shoreline. The additional inundation would alter the vegetative characteristics of designated critical habitat similar to that discussed above.

In general, northern spotted owl usage of areas immediately adjacent to the Cle Elum River and along the shoreline of the reservoir for foraging and nesting habitat is extremely low because of the proximity to roads and because noise reduces foraging success. Under existing conditions, northern spotted owls would likely avoid the reservoir perimeter for breeding purposes and foraging (Buchanan and Irwin, 1998; Buchanan et al., 2004), but may use this area for dispersal.

The 42 additional acres that would be inundated would experience changes in vegetation type, although the degree of this effect is difficult to predict. Changes in vegetation type that reduce tree cover could affect northern spotted owl. The underlying potential spotted owl use of the habitat and the magnitude of change affects whether owls would be impacted. Along the reservoir's east shore, the existing habitat is highly fragmented, human use is high, and northern spotted owl occupancy is not expected. The loss of a narrow band of trees along the east shoreline is not expected to affect northern spotted owls. Similarly, the area that would be inundated along the north end of the reservoir is lower quality habitat due to low canopy cover and high recreational use. Any habitat loss in this area would be offset by measures taken to prevent further recreational dispersal (Section 4.14.8). The west side of the reservoir is characterized by relatively continuous forest cover that may provide suitable habitat for northern spotted owl nesting, foraging, and roosting. The narrow band of forest along the west side of the reservoir that would be inundated is only a fraction of the forested habitat present, and would not be used by spotted owls for nesting and roosting. However, in order to insure no overall loss of function in this area, Reclamation has committed to restore Federal lands adjacent to Cle Elum Reservoir that have been degraded through prior private forest practices or excessive public use (Section 4.9.8). These restoration measures would insure no decrease in habitat function to the edge effects associated with the expanded reservoir area. Based on the above factors and the consideration of the net effects on spotted owl habitat, Reclamation expects no overall adverse impact on northern spotted owl or their habitat.

Although the area around the reservoir includes suitable nesting habitat for marbled murrelets, there is no designated critical habitat near the reservoir and the reservoir is outside the expected range this species. Therefore, the project would not affect marbled murrelet.

4.9.4.2 Additional Storage Capacity for Instream Flow

Operation

When available, the additional storage capacity could provide Reclamation with greater flexibility to meet objectives for bull trout and MCR steelhead inhabiting the Cle Elum Reservoir and habitats in Cle Elum and Yakima rivers downstream of the reservoir. The different proposed operational scenarios are described comprehensively in Section 4.2.4.2 and impacts to bull trout and MCR steelhead are generally the same as those described for fish in Section 4.6.4.2. Using the additional storage capacity for instream flows is unlikely to affected listed terrestrial species because flows would remain within the historical range and would not alter riparian habitat.

Bull Trout. Under Alternative 2, bull trout are expected to benefit from different uses of the additional storage capacity. Under Scenario 1, winter flows would be increased, providing flow and habitat complexity improvements for bull trout rearing in the Cle Elum River below the reservoir. Under Scenario 2, flow conditions would be improved during the outmigration of salmon juveniles which may indirectly benefit bull trout that prey on smolts. Under Scenario 3, summer flow pulses would be used to improve habitat connectivity between the lower and upper Yakima River. This use could benefit bull trout by helping to provide a better prey-base, particularly sockeye salmon which is a key forage fish for bull trout. In addition, if bull trout are present in the river downstream from the dam, this scenario would benefit those individuals. Under Scenario 4, stored water would be used to increase habitat connectivity between the Cle Elum Reservoir and the Cle Elum and Yakima rivers for juvenile bull trout by increasing the operational duration of downstream passage for the proposed Cle Elum Dam fish passage facilities. This scenario would benefit bull trout in the Cle Elum basin by helping to maintain a viable sockeye population that provides a key forage-base. Scenario 5 would represent a combination of the benefits expected under Scenarios 2 through 4. However the individual beneficial contribution of each proposed scenario would be lessened by combining them, but multiple fish passage and habitat objectives could be met. No change or impact to Cle Elum River or Yakima River winter flows will result from Scenario 5.

MCR Steelhead. Under Alternative 2, MCR steelhead are expected to benefit from different uses of the additional storage capacity similar to bull trout. Under Scenario 1, winter flows would be increased, providing flow and habitat complexity improvements for steelhead juveniles rearing in the Cle Elum River downstream from the reservoir. Both adult and juvenile steelhead migrate during the fall and winter (Karp et al., 2009; WDFW, 2002) and additional flows could improve passage and overwintering conditions during that period (Reclamation and Ecology, 2012). Under Scenario 2, flow conditions would be improved during the outmigration of steelhead juveniles and kelts. Under Scenario 3, summer flow pulses would be used to improve habitat connectivity between the lower and upper Yakima River. This use of water is intended to benefit sockeye and Chinook, but would also benefit any steelhead migrating upstream at this time. Under Scenario 4, stored water would be used to increase habitat connectivity between Cle Elum Reservoir and the Cle Elum and Yakima rivers for reintroduced steelhead smolts by increasing the operational duration of the proposed Cle Elum fish passage facilities. Scenario 5 would represent a combination of the benefits expected under Scenarios 2 through 4.

4.9.4.3 Rock Shoreline Protection

Construction

Construction to install shoreline protection measures would generate noise and activity that could displace wildlife as described in detail below. Impacted species could include bull trout and northern spotted owl. No MCR steelhead are located above the dam and marbled murrelets are not expected to be present because of their range. No terrestrial species, such as gray wolf, grizzly bear, and Canada lynx, are likely to be in the area. Grizzly bears and gray wolves have been documented in the area, but are unlikely to be in the construction areas because they prefer habitat not affected by human disturbance (Sections 3.9.4.2 and 3.9.4.4).

Bull Trout. Bull trout may be present in nearshore littoral habitats that shoreline protection activities modify and the expected impacts are the same as anticipated for other fish species (Section 4.6.4.2). These include minor potential positive and negative effects on habitat processes that provide cover and forage for reservoir fish species. All construction would occur in the dry when the reservoir is drawn down, reducing the potential for impacts on fish species, including bull trout.

Northern Spotted Owl and Marbled Murrelet. Construction of shoreline protection measures would generate increased noise, which has the potential to affect species such as the northern spotted owl. Although unlikely to be present, potential effects would be the same for marbled murrelet. More information on noise impacts on the northern spotted owl is available than for other species so information is reported here as an example of potential noise impacts on wildlife. The information provides a baseline for analyzing impacts.

Threshold distances have been established where a target species (in this case the northern spotted owl) elicit a specific response to noise (Service, 2003). Threshold distances used are from a biological opinion prepared for the Olympic National Forest (Service, 2003), and may not necessarily apply in all situations, especially since the forest practices generally use equipment that differs from construction equipment and include the use of noise-reducing conservation measures.

The threshold distances include the following:

- *Noise-only detectability threshold* (where the noise is detectable to a spotted owl, but the owl does not show a response) – 4 dBA above baseline or ambient noise levels
- *Noise-only alert threshold* (where the northern spotted owl shows an apparent interest by turning its head or extending its neck) – 57 dBA
- *Noise-only disturbance threshold* (where the spotted owl shows avoidance of the noise by hiding, defending itself, moving its wings or body, or postponing a feeding) – 70 dBA
- *Noise-only injury threshold* (where the spotted owl is actually injured, which can be defined as an adult being flushed from a nest or young missing a feeding) – 92 dBA

The detectability, alert, and disturbance threshold distances differ as baseline noise differs, but the injury threshold of 92 dBA remains constant.

Construction noise is a point source noise. Noise from a point source spreads spherically over distance, traveling in all directions equally from the source. The standard reduction for point source noise is 6 dB per doubling of distance from the source (Service, 2003). An additional 1.5 dB reduction to the 6 dB occurs when soft site conditions, such as ground cover or normal unpacked earth, exist between the source and the receptor. Dense vegetation can reduce noise levels by 5 dB for every 100 feet of vegetation, up to a maximum of 10 dB.

The expected combined noise level of construction equipment (e.g., excavator, backhoe, dump truck) operating together during installation of shoreline protection is 84 dBA at distance of 50 feet from the source. In general, soft site conditions exist on the site, which means that calculated noise levels would be 7.5 dB less per doubling of distance. An additional 10 dB due to dense vegetation would further reduce the calculated noise level. Estimated ambient noise in the vicinity of Cle Elum Reservoir is approximately 40 dBA (Service, 2003). Ambient noise in the areas where shoreline protection is proposed is likely higher than 40 dBA because these areas are currently developed and contain low to moderate levels of noise and human activity. Spotted owl and marbled murrelet occurrence in the immediate project area is unlikely due to roads and residential development. However, construction noise may travel up to 1,145 feet before reaching background noise levels of 40 dBA. The closest documented occurrence of an active reproducing pair of spotted owl is approximately 1.5 miles (about 7,900 feet) northeast of the top of the reservoir (USFS, 2014). Reclamation does not anticipate that marbled murrelets would be in the area because less than 6 percent of marbled murrelet sightings occur in locations more than 40 miles from the marine environment; the most inland nest documented in Washington is approximately 55 miles from the ocean (WDFW, 2013). The Cle Elum Reservoir is located approximately 57 miles due east of Puget Sound.

Noise levels would not result in direct harm to spotted owls or marbled murrelets, if present. However, they may elicit disturbance behaviors within 24 feet of construction activities. Construction noise could have an adverse impact on northern spotted owl if they were located within 24 feet of construction; however, no known owl nest sites are within 1 mile of any proposed construction (USFS, 2014). Therefore, northern spotted owl and marbled murrelet are unlikely to be affected by construction-related noise and human activity. Reclamation would conduct northern spotted owl surveys prior to construction to confirm owl absence.

Operation

Impacts on bull trout due to operation are unlikely because reservoir levels would last approximately 40 days, limiting the exposure time to the shoreline protection areas. Currently, no MCR steelhead are found in the reservoir and thus there would be no impacts on MCR steelhead. When steelhead are reintroduced to the reservoir in the future, impacts to steelhead would be similar to those to bull trout.

The proposed shoreline protection activities would permanently replace some wildlife habitats, such as areas of conifer forest and deciduous shrub communities, with rock embankment. Impacts on wildlife habitat would be limited by the small scale of the shoreline protection projects (approximately 3 miles) compared to the total length reservoir shoreline (approximately 20 miles) and because most are located in previously disturbed areas. Expected impacts on listed species are minor, at worst, since the habitat quality in areas scheduled for shoreline protection is limited. Marbled murrelets are not anticipated or known to use habitats surrounding the reservoir for nesting and the closest foraging habitat for murrelets is in the marine environment of Puget Sound over 57 miles west of the Cle Elum Reservoir. Suitable northern spotted owl habitat is located near the Cle Elum Reservoir. Owls presence in the area proposed for shoreline protection is expected to be minimal. Owl nesting does not occur within close proximity to large forest openings (Buchanan and Irwin, 1998; Buchanan et al., 2004). In addition, relatively high human activity in these areas is expected to discourage spotted owl use, although the owls may move through the habitat while dispersing or foraging. The loss of low quality habitat is unlikely to affect terrestrial species, such as gray wolf, grizzly bear, and Canada lynx, given their small numbers in the project area and their ability to use other habitats in the reservoir vicinity (Section 3.9.4).

It is possible that during high water events shore armoring would cause unanticipated reflection of wave energy, potentially causing unpredictable erosion elsewhere. Reclamation will monitor shoreline erosion to evaluate the success of shoreline protection measures.

4.9.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Raising the elevation of the saddle dikes near the dam and right abutment of the dam would result in construction noise and increased human activities intermittently for approximately 6 to 9 months. Temporary impacts on threatened and endangered fish and wildlife species would be similar to those described for rock shoreline protection, although the spatial extent of impacts may be smaller since these structures are located in more developed areas around the reservoir and construction would occur in the dry area when the reservoir is drawn down.

Operation

Impacts on ESA-listed species would be similar to those described for rock shoreline protection. The saddle dikes and right dam abutment are located above the reservoir high pool level, preventing fish exposure to the completed projects. No impacts would occur on other ESA-listed species after construction because the completed structures are not located near suitable habitat.

4.9.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction of shoreline protection measures at the recreational facilities and Salmon La Sac Road would result in construction noise and increased human activities for approximately 2 months. Temporary impacts on threatened and endangered fish and wildlife species would be similar to those described for rock shoreline protection (Section 4.9.4.3). Construction of shoreline protection on the west side of the reservoir would involve minimal disturbance because only hand tools would be used to secure large wood in place. No impacts on terrestrial listed species are anticipated.

Operation

Similar to rock shoreline protection, no impacts would occur on ESA-listed species following construction.

4.9.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction of aquatic habitat improvements at stream mouths on the west side of the Cle Elum Reservoir would result in short-term construction noise and increased human activities. Temporary impacts on threatened and endangered fish and wildlife species would be limited because Reclamation would only use hand tools fir anchoring and placement of large wood. The construction impacts for improving habitat at stream mouths would be insignificant for bull trout and would be the same as described for other species in Section 4.6.4.6. MCR steelhead have not been reintroduced to Cle Elum Reservoir, but it is assumed that construction impacts would also be the same for reintroduced steelhead as described for other species in Section 4.6.4.6 if they are reintroduced prior to completion of the aquatic habitat improvements.

Operation

Similar to rock shoreline protection, no impacts would occur on listed species following construction. Habitat would be improved at the stream mouths. The operational impacts for improving habitat at stream mouths would be an increase in habitat complexity for bull trout associated with the placement of large woody debris in Para Creek, Branch Creek, and Two Coves Creek (Figure 2-10). MCR steelhead have not been reintroduced to Cle Elum Reservoir, but it is expected that they would also benefit from increased habitat complexity as described in Section 4.6.4.6 when they are reintroduced.

4.9.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.9.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.9.4.1).

4.9.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.9.4.2).

4.9.5.3 Hybrid Shoreline Protection

Construction

Construction impacts associated with hybrid shoreline protection would be similar to those for rock shoreline protection (Section 4.9.4.3).

Operation

Impacts on bull trout would be similar to those for rock shoreline protection (Section 4.9.4.3) although the hybrid protection would provide better habitat conditions. In the long term, hybrid shoreline protection may support the succession and function of typical riparian habitats, providing cover and forage for bull trout in littoral habitats. Bull trout use of these areas is expected to be relatively low minimizing any positive or negative impacts on bull trout.

Because no MCR steelhead are currently present in the reservoir, there would be no impact on that species. It is anticipated that they will be reintroduced at some point in the future. At that time, impacts to steelhead would be similar to those described for bull trout. Impacts on northern spotted owl and marbled murrelet would be the same as those for rock shoreline protection described for Alternative 2 (Section 4.9.4.3).

4.9.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.9.4.4).

4.9.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.9.4.5).

4.9.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.9.4.6).

4.9.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.9.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.9.4.1).

4.9.6.2 Additional Storage Capacity for TWSA

Operation

Under Alternative 4, Reclamation could use the additional storage capacity for irrigation needs and instream flows. If the water were used primarily to benefit irrigation, the increased summer flows and decreased winter flows would not benefit bull trout or MCR steelhead in the lower Cle Elum or upper Yakima rivers (Section 4.6.4.2). Under operational scenarios in which there are increased instream flows in October through March, the benefits described for Alternative 2 in Section 4.9.4.2 would occur.

Use of the additional storage capacity for TWSA or instream flows would not impact other listed species.

4.9.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.9.4.3).

4.9.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.9.4.4).

4.9.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.9.4.5).

4.9.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.9.4.6).

4.9.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.9.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.9.4.1).

4.9.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.9.6.2).

4.9.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.9.6.3).

4.9.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.9.4.4).

4.9.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.9.4.5).

4.9.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.9.4.6).

4.9.8 Mitigation Measures

Mitigation measures such as construction BMPs identified in Sections 4.3.8 and 4.4.8 would minimize impacts to threatened and endangered species during construction of the shoreline protection measures by reducing erosion and sedimentation. Construction would occur when the reservoir is drawn down to minimize impacts to bull trout in the reservoir and bull trout and MCR steelhead in the lower Cle Elum River. Reclamation would comply with applicable fish windows. Measures to minimize impacts to fish (Section 4.4.6), vegetation (Section 4.4.7), and wildlife (Section 4.4.8) would also reduce impacts to ESA-listed species.

To mitigate for potential impacts to northern spotted owl, Reclamation would work with the USFS to restore Federal lands adjacent to Cle Elum Reservoir that have been degraded through prior private forest practices or excessive public use. Restoration activities would enhance habitat and other natural functions as well as reduce fragmentation and create more contiguous forested habitat within designated critical habitat for northern spotted owl. The proposed activities include restoration of former access roads, which were built in association with private forest practices and that are no longer open or accessible or used. Restoration would be conducted on approximately 3 miles of former road corridors. Road corridors that are furthest removed or isolated would be preferred over road corridors near forest edges to maximize the beneficial effects of the restoration. The restoration area is shown on Figure 4-6. Restoration would include the following activities:

- Removing culverts
- Recontouring or removing fill and recreating natural slopes
- Scarifying former road beds using an excavator to reduce compaction
- Pulling of vegetation and rocks from adjacent areas to restore the soil surface and prevent erosion
- Treating weeds with herbicides
- Planting native vegetation

Reclamation is initiating ESA consultation with the Service and NMFS. Reclamation would implement specific mitigation for ESA-listed fish and wildlife species that the agencies require as part of consultation. For northern spotted owl, Reclamation would determine whether specific surveys were necessary to minimize construction impacts and then conduct surveys if necessary. Reclamation would implement the conservation measures and recommendations provided by the Service in the *Fish and Wildlife Coordination Act Report* (Service, 2012b) (Section 5.4.2).

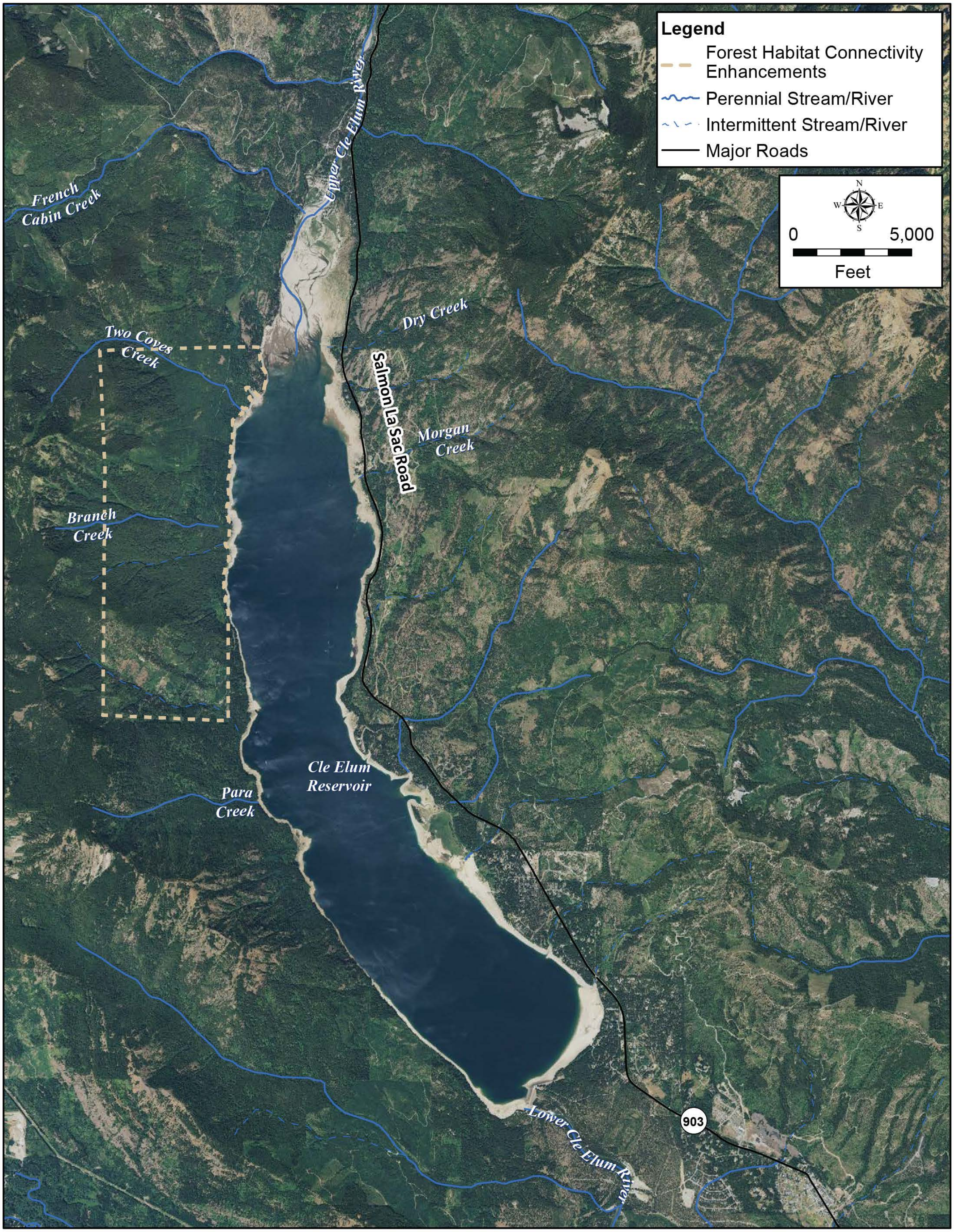

Figure 4-6. Forest Habitat Connectivity Enhancements

4.10 Visual Quality

4.10.1 Methods and Impact Indicators

The analysis of visual quality impacts primarily entails identification and description of changes to visual quality of the landscape from existing conditions. The area of potential impact for visual quality includes views of Cle Elum Dam, Cle Elum Reservoir and the surrounding shoreline, and the Cle Elum River downstream from the reservoir. The USFS landscape character goal for the Cle Elum Reservoir area is to maintain a natural appearing to slightly altered landscape character that expresses predominantly natural processes in the scenic viewsheds. In this context, adverse visual impacts are modifications to the environment that interrupt the visual character and integrity of the landscape or that disrupt and encroach upon the harmony of the basic visual elements. Similarly, Reclamation evaluates the visual impact of the Cle Elum Pool Raise Project based on the relative contrast it would have with the landscape compared to the existing landscape without the project. Elements in a project that have contrast are those that are unlike or in opposition to the forms, lines, colors, and textures that combine in the native landscape to form a visual pattern. Greater visual contrasts result in impacts more adverse to the aesthetic quality of the setting.

Based on the above considerations, Table 4-15 lists the indicators for determining potential impacts on visual quality and their significance criteria. The basis for determination of an impact is knowledge of the affected environment, types of viewers involved, and professional judgment. Changes can be localized but significant if visible to residents, recreational users, and others familiar with the preexisting visual quality of the area.

Table 4-15. Visual Quality Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Introduction of new facilities or modifications to existing facilities at the dam	Substantially contrast with or substantially change the overall appearance of the existing dam, or substantially detract from the visual quality of the area
Changes in reservoir inundation and drawdown patterns	Renders the reservoir a less dominant element of the landscape, or results in an unnatural appearing shoreline over the long-term such that it would make the area less desirable for recreation
Modifications to the reservoir environment related to shoreline protection	Long-term and distinct contrasts that impact the overall visual quality of Cle Elum Reservoir
Changes to streamflows in the Cle Elum River	Change in the appearance of the Cle Elum River from fluctuating streamflows outside the range of existing flows that impairs the overall visual quality of Cle Elum Reservoir
Consistency with relevant Federal visual quality management plans and policies	Modifications substantially conflict with Visual Quality Objectives established in the 1990 Wenatchee National Forest Plan and the USFS Scenery Management System

4.10.2 Summary of Impacts

The No Action Alternative would result in adverse impacts on visual quality from construction of permanent fish passage facilities. There would be no adverse impacts on visual quality related to reservoir operations because there would be no changes, and construction of interim fish passage facilities would involve minor impacts only. However, ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial impacts on visual quality due to degradation of the terrestrial, nearshore and aquatic environments. Construction of the two YRBWEP Phase II conservation projects is not likely to affect visual resources because the projects are located in developed agricultural areas and would have a similar appearance to existing irrigation facilities.

Visual quality effects of the permanent fish passage facilities would remain consistent with the analysis from the *Cle Elum Dam Fish Passage and Fish Reintroduction Project EIS* (Reclamation and Ecology, 2011b). Permanent fish passage facilities that would be visible upstream of the dam include the intake structure which would present a substantial change and could be highly visible at low pool levels. The structure would remain visually consistent with the overall setting of the south shoreline where the existing dam is predominant on the landscape. As a result, the permanent fish passage facilities would not contrast substantially with the existing dam and impacts would be less than significant.

From a short-term perspective, the Cle Elum Pool Raise Project would involve visual quality impacts on local residents and visitors during construction activities, as local views change accompanying construction. None of these short-term impacts would be significant. Long term, the project would involve localized visual quality impacts from dam modifications, shoreline protection, and reservoir pool changes. Dam modifications would not substantially contrast with existing dam elements or detract from the visual quality of the area. Shoreline protection, under any of the alternatives, would not constitute a strong contrast with the reservoir shoreline. Reservoir pool changes would preserve the character and dominance of the reservoir on the landscape. Therefore, these changes would not result in significant adverse visual quality changes.

None of the alternatives would change the visitor perception of natural appearance or the overall dominant element of the reservoir on the landscape. Therefore, Reclamation expects the project to meet the Visual Quality Objective (VQO) of “Retention” and the Scenic Integrity Level (SIL) of “High” prescribed in the USFS Forest Plan (Section 3.10). The landscape would continue to retain its high scenic integrity. The project would not affect the views from the Mountains to Sound Greenway or the National Scenic Byway.

4.10.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, the visual setting for Cle Elum Reservoir would continue to provide a perceived “natural” though slightly altered landscape with limited development along the shores. Reclamation would continue to operate Cle Elum Reservoir as it currently does and Cle Elum Dam would continue to be the predominant development on the south shore. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial impacts on visual quality due to degradation of the terrestrial, nearshore and aquatic environments.

The reconstructed interim fish passage facilities on the downstream side of Cle Elum Dam would appear the same as, or similar to, the existing facilities. There would be no changes to the appearance of the dominant features of Cle Elum Dam and no changes to overall reservoir visual quality. Construction of the two YRBWEP Phase II conservation projects is not likely to affect visual resources because the projects are located in developed agricultural areas and would have a similar appearance to existing irrigation facilities.

Visual quality effects of construction of permanent fish passage facilities would remain consistent with the analysis from the *Cle Elum Dam Fish Passage and Fish Reintroduction Project EIS* (Reclamation and Ecology, 2011b). Construction of the permanent fish passage facilities may cause short-term impacts on visual quality from construction of the juvenile bypass conduit, access roads and bridge, and presence of heavy equipment and other temporary structures.

Long-term visual quality effects of the permanent fish passage facilities would remain consistent with the analysis from the *Cle Elum Dam Fish Passage and Fish Reintroduction Project EIS* (Reclamation and Ecology, 2011b). The new intake structure would be located upstream of the dam and would result in adverse effects on visual quality. The appearance would vary with seasonal fluctuations in reservoir levels. At low pool levels, the intake structure would present a substantial change and could be highly visible, but would remain visually consistent with the overall setting of the south shore where the existing dam is predominant. Similar to the existing dam structure, the intake structure will be made of concrete, thereby repeating a color and texture that is present on the landscape. Other components of the downstream fish passage facilities, such as the helix structure and intake pipes, would be buried. Fish passage facilities on the downstream side of the dam, including the barrier dam, fish ladder and collection facility would cause minimal visual impacts because of the limited viewpoints of this area. With the use of similar materials as the existing dam structure, and by burying other fish passage facilities, the permanent fish passage facilities would not contrast substantially with the existing dam and impacts would be less than significant.

4.10.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.10.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction of the modified radial gates at the spillway would result in temporary visual impacts for approximately 6 to 9 months in the area surrounding the dam spillway gates. Construction of the radial gates would consist of work on the existing radial gates, including sandblasting, installing new gate extensions, welding, and recoating. These activities would remain visually consistent with equipment and activities that are periodically present at the dam, such as from normal maintenance and repair activities. Because the radial gates are located on the downstream side of the dam, access to and views of these facilities are limited.

Small areas of the dam crest may be visible from roads and bridges near Ronald to the south (see Photo 3-11), but radial gates are not visible. Impacts are expected to be minor as public access is restricted downstream of the dam and construction activities would not contrast substantially with the appearance of the existing dam.

Operation

Visual impacts would relate to modifications to the spillway radial gates. The modified spillway gates would consist of five new 3-foot high by 37-foot wide fabricated steel extensions with flow diverters on top of each existing gate. These elements would remain visually consistent with the dimensions and appearance of the existing spillway gates (Figures 2-1 and 2-2 illustrate the before and after appearance of the spillway gates).

Once complete, the modified spillway radial gates would have an altered appearance but would not substantially change the overall appearance of the existing dam. The 3-foot extension and the flow diverters would extend above the existing gates but would likely not be noticeable to residents and recreationists from the upstream, reservoir side, except at close-in locations where it remains visually subordinate to the overall dam structure. With the use of nonreflective covers, the modified spillway would not cause visual impacts that could detract from the visual quality of the surrounding area. Because the modifications would not substantially contrast with, or change the overall appearance of the dam and would not detract from the visual quality of the reservoir and surrounding areas, the impacts would be considered less than significant impact.

The radial gate modifications would be consistent with VQO/SIL established by the 1990 *Wenatchee National Land and Resource Management Plan* and the USFS Scenery Management System. The modifications would be in keeping with the VQO of "Retention" and SIL of "High" by maintaining the same overall appearance of Cle Elum Dam. The proposed modifications would not increase the level of noticeable deviations on the landscape.

Increased Reservoir Pool

Operation

Increased reservoir pool levels from the project would inundate more land around the reservoir than the existing full pool for about 40 days per year. The higher reservoir pool would increase the area of inundation on the reservoir shoreline by approximately 46 acres, corresponding to a 3-foot rise in elevation. The majority of reservoir users are recreational users who visit for short periods. In most areas, it is unlikely that the casual viewer would notice the 3-foot increase in the water level. The increase would be most noticeable in the upper reservoir and along inundated narrow segments of flatter areas of shoreline. These areas would generally be limited to undeveloped Federal lands where no shoreline protection is proposed. In these areas, the increased reservoir pool would represent noticeable changes to the visual environment but would not impair the overall visual quality of Cle Elum Reservoir because the reservoir would remain the dominant element on the landscape. Views would be slightly altered from access roads and campsites raised to accommodate the higher pool level at Cle Elum River Campground and Wish Poosh Campground, but the overall appearance of the reservoir and campgrounds would remain the same.

A body of water generally is visually pleasing to most individuals. However, as the reservoir is drawn down, exposed mud flats around the shallower parts of the newly inundated reservoir areas may result in an unnatural appearing shoreline. Unnatural appearing elements of these newly inundated areas include loss or change in vegetation as well as erosion. The expected loss of shoreline vegetation and increase in eroded area would be noticeable in the immediate area, especially in the early years of increased erosion. Any newly exposed areas would appear more natural over time, likely within a span of a few years, as these areas stabilize. In the short term, the visual impact of exposed mud flats or shoreline would be minor in many areas due to the duration and angle of view. Overall, these impacts would be less than significant because these areas would be limited as Reclamation would not draw down the reservoir below current low levels and proposed shoreline protection would limit the segments of the flatter shoreline areas exposed to inundation.

The increased reservoir pool would be consistent with “Retention” VQO and SIL of “High” allocated for the Cle Elum Reservoir. The reservoir would be within the setting of other reservoirs in the area, and the increased reservoir pool would not change the visitor perception of natural appearance or the overall dominant element of the reservoir on the landscape.

4.10.4.2 Additional Storage Capacity for Instream Flow

Operation

Using the additional storage capacity to improve instream flows in the Cle Elum and Yakima rivers would result in changes to streamflows in the Cle Elum and Yakima rivers. Potential scenarios for filling the reservoir and releasing the water would not create fluctuations in water levels that are substantially different than those that have been experienced historically (Section 4.2.4.2). This would have a negligible effect on scenic resources. The Cle Elum and Yakima rivers would continue to meet established VQO of “Retention” and SIL of “High” allocated for the Cle Elum Reservoir. Since the changes to streamflows would not cause channel erosion and would not be outside the range of existing flows, impacts to the Cle Elum and Yakima rivers would be less than significant. Different scenarios for how Reclamation would allocate the additional storage capacity could cause fluctuations in the reservoir level, but the reservoir currently fluctuates during the year and from year to year. These fluctuations are consistent with the way the reservoir is currently operated and would not impair the overall visual quality of Cle Elum Reservoir.

4.10.4.3 Rock Shoreline Protection

Construction

Construction of the rock shoreline protection would result in temporary modifications to the reservoir environment for approximately 2 months during each construction year in the area surrounding the proposed protection. Construction would occur in the late summer and early fall when the reservoir is drawn down. Some people would notice mechanized equipment, grading activity, material movement, construction of rock shoreline protection, and human activity in the construction areas, which would be visually inconsistent with the appearance of shoreline areas adjacent to, or nearby to, the construction areas. While construction equipment, materials and activity could present a distinct contrast with the existing shoreline settings of the construction areas, impacts would be short-term and limited to a few locations along the reservoir shoreline during any one construction season. Construction activities would also require temporary roads to access areas to the west and east of the dam, and along certain shorelines where stabilization is proposed. After construction, Reclamation would restore the temporary roads with in-kind native vegetation. The appearance of some areas would change from forested to cleared land, which would present a distinct contrast with adjacent, forested settings. However, forested lands would remain predominant around these areas and the cleared land would not be noticeable to most viewers at the reservoir. As a result, construction of the rock shoreline protection would not result in long-term and distinct contrasts that impact the overall visual quality of Cle Elum Reservoir and impacts would be less than significant.

Operation

Rock shoreline protection measures would modify approximately 3 miles of reservoir shoreline by installing rock walls, riprap, and gabion baskets on the shoreline and grading the slopes. The design would grade existing banks to a gentler slope than exists currently. Shoreline protection would be a long-term visual change along the shoreline. Unlike existing unmodified shoreline areas, the shoreline protection would appear as a uniform and altered embankment, which in some areas would contrast with existing conditions where exposed dirt, cobble, rock, or vegetated areas present a more natural or nonuniform appearance. Fluctuations in reservoir levels would vary this visual parameter. When reservoir levels are high, the rock shoreline protection would not be visible and no contrast would be present. When reservoir levels are low, the rock shoreline protection would provide a moderate contrast with the existing exposed shoreline. By matching the rock protection material to the native rock, regrading the shoreline to a gentle slope, and revegetating areas with native plants, Reclamation would create shoreline protection measures that repeat the form, line, color and texture of the landscape to minimize the amount of contrast. As a result, impacts are expected to be less than significant.

While the views at shorelines with rock protection would be altered along the narrow band of shoreline protection, the overall visual quality of Cle Elum Reservoir would remain a naturally-appearing landscape. The Cle Elum Reservoir area would continue to meet established VQO of “Retention” and SIL of “High.”

4.10.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Locations to be affected by increasing the elevations of Saddle Dikes 1, 2 and 3, and the right dam abutment would be limited to areas near the dam. Construction equipment, materials, and activity would be most visible from close-in distances on the reservoir where construction equipment, materials and activity would substantially contrast with the existing setting. Because access near the dam is restricted, and Speelyi Beach and Lake Cabins Road would close for the duration of construction, most people would be viewing the construction activity from a distance. Small areas of the dam crest may be visible from roads and bridges near Ronald (see Photo 3-11), but the saddle dikes and the right dam abutment are not visible. Considering the limited viewing opportunities, impacts on visual quality from construction activities at the saddle dikes and right dam abutment would be minor.

Construction activities would also require clearing forested areas to provide work areas, work access, and a borrow area. After construction, Reclamation would restore the temporary work areas with in-kind native vegetation. The appearance of some areas would change from forested to cleared land, which would present a distinct contrast with adjacent, forested settings. However, forested lands would remain predominant around the dam and the cleared land would not be noticeable to most viewers at the reservoir. As a result, the clearing of forested areas to support construction at the saddle dikes and the right dam abutment would not substantially contrast with, or substantially detract from the visual quality of the area and impacts would be less than significant.

Operation

The addition of a layer of riprap on the upstream face of the dikes would not be noticeable to residents or the casual visitor at most distances. The material would blend with the surrounding area and would be marginally visible to people who are viewing the dam from the reservoir. These minor changes would not substantially contrast with existing dam elements, and would not detract from the visual quality of the reservoir area. As a result, impacts would be less than significant.

Increasing the elevations of Saddle Dikes 1, 2 and 3, and the right dam abutment, would be in keeping with established VQO of “Retention” and SIL of “High” by maintaining the same overall appearance of the Cle Elum Dam. The proposed modifications would not increase the level of noticeable deviations on the landscape.

4.10.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction to provide shoreline protection of public lands and to maintain existing access and use of USFS recreation facilities would result in similar temporary modifications to the reservoir environment as described for rock shoreline protection. The presence of construction equipment, materials and activity at Wish Poosh Campground and Boat Launch, Cle Elum River Campgrounds, Speelyi Beach Day Use Area, the west shoreline, and Salmon La Sac Road would be visually inconsistent with the appearance of shoreline areas adjacent to, or nearby to, the construction areas. While construction equipment, materials and activity would present a distinct contrast with the existing settings of the construction areas, impacts would be short-term. The use of hand methods to construct shoreline stabilization on the west shoreline would minimize contrast with existing shoreline environments.

Most construction would occur during the recreation off-season (between Labor Day and Memorial Day) when the reservoir is drawn down and there are fewer visitors. Construction activity at Wish Poosh and Cle Elum River campgrounds may be noticeable to some people. However, the campgrounds would be closed for the season when construction occurs, so construction activities would only be visible from a distance. Construction activity to raise portions of Salmon La Sac Road would be highly visible to travelers along the road and visitors to the upper reservoir. However, impacts would be short-term. Overall, these impacts would be less than significant because the effects are temporary and restricted access to certain construction areas limit views of some construction areas.

Operation

Following restoration activities, the net effect to visual quality in comparison to current conditions would be largely unnoticeable to the casual visitor. Long-term, the shoreline protection at the public lands and facilities would result in the same type of visual impacts as described for rock shoreline protection.

Reclamation would stabilize the shoreline on south end of the west bank using existing, onsite driftwood, trees, and vegetation as stabilization material to minimize disturbance and impacts. As a result, the stabilization would match existing materials, presenting little contrast with existing conditions. The existing “natural” appearing landscape would be maintained. At developed campgrounds, foreground views already have an altered or slightly altered appearance. The proposed work would not alter this perception, and the overall visual quality of Cle Elum Reservoir would remain naturally-appearing.

Improvements to provide shoreline protection of public lands and to maintain existing access and use of USFS recreation facilities would be consistent with established VQO of “Retention” VQO and SIL of “High” for the Cle Elum Reservoir area. The activities would meet the these VQOs by protecting developed recreation, facilities, and access roads, and stabilizing the USFS recreation areas on the west shoreline with existing, onsite and natural materials. The landscape character would be reflective of a natural appearing environment. Views from sensitive viewing locations would be minimally affected by shoreline protection activities and altered facilities.

4.10.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction to improve aquatic habitat at the mouths of the three streams on Federal lands (Para Creek, Branch Creek, and Two Coves Creek) would result in temporary modifications to the reservoir environment. Construction would utilize hand equipment and methods only. If recreationists are in the area during construction, they would notice felling of trees and human activity in the construction areas to place and secure the logs. This activity would be visually inconsistent with the existing setting, which is undeveloped with little human activity. These impacts would be less than significant because the effects would be temporary and construction activities would minimally contrast with the existing environment given the use of hand equipment and methods only.

Operation

Following construction, the net effect to visual quality in comparison to current conditions would be largely unnoticeable to the casual visitor. Long-term, the anchored logs would resemble naturally-occurring logs in the streams. As a result, improvements to aquatic habitat would not contrast with or impact the overall visually quality of Cle Elum Reservoir and impacts would be less than significant.

Aquatic habitat improvements would be consistent with established VQO of “Retention” VQO and SIL of “High” for the Cle Elum Reservoir area. The activities would meet the VQO and SIL by increasing habitat complexity, function, and microhabitat on the west shoreline with existing, onsite and natural materials. The landscape character would be reflective of a natural appearing environment. Views from sensitive viewing locations would be minimally affected by shoreline protection activities and altered facilities.

4.10.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.10.5.1 Radial Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.10.4.1).

4.10.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.10.4.2).

4.10.5.3 Hybrid Shoreline Protection

Construction

Construction of hybrid shoreline protection measures would have the same general short-term, minor, localized, and temporary visual quality impacts as the rock shoreline protection measures under Alternative 2 (Section 4.10.4.3).

Operation

Under this alternative, Reclamation would use shoreline protection treatments from a variety of protection measures, both alone and in combination with rock shoreline protection measures, depending on the site characteristics of the shoreline.

Hybrid shoreline protection incorporates natural materials and features and would have little contrast with the existing shoreline. In general, where hybrid techniques are used, they would appear as part of the natural landscape. Perched beaches would replicate the variable slopes and materials found in natural beaches (Figure 2-9 illustrates the appearance of a perched beach). Like natural beaches, Reclamation would surface flatter beach slopes with fine-grained sand and small gravel, and use cobbles for steeper slope surfaces. Other protection techniques (riprap, rockery wall) would result in the same type of long-term visual impacts as described for rock shoreline protection under Alternative 2 (Section 4.10.4.3).

Hybrid shoreline protection measures would be consistent with established VQO of "Retention" VQO and SIL of "High" for the Cle Elum Reservoir area. The activities would meet the VQO and SIL by matching the rock protection material to the native rock, regrading the shoreline to a gentle slope, and revegetating areas with native plants. The landscape character would be reflective of a natural appearing environment. Views from sensitive viewing locations would be minimally affected by hybrid shoreline protection.

4.10.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.10.4.4).

4.10.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.10.4.5).

4.10.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.10.4.6).

4.10.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.10.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.10.4.1).

4.10.6.2 Additional Storage Capacity for TWSA

Use of the additional water for TWSA would not have visual quality impacts at the reservoir.

4.10.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.10.4.3).

4.10.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.10.4.4).

4.10.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.10.4.5).

4.10.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.10.4.6).

4.10.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.10.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.10.4.1).

4.10.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.10.6.2).

4.10.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.10.5.3).

4.10.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.10.4.4).

4.10.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.10.4.5).

4.10.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.10.4.6).

4.10.8 Mitigation Measures

Reclamation would coordinate with public land managers regarding the design and construction of shoreline protection measures. Reclamation would start the construction work at Wish Poosh Campground and Boat Launch and Cle Elum River Campground after they are closed for the season in September, which would minimize the number of recreational users present during construction.

Reclamation would restore temporary access, work areas, and staging areas and replant with native species. Reclamation would design shoreline protection to blend with the surrounding areas by using native rock and replanting with native species. Reclamation would stabilize the south end of the west bank and the three stream mouths using existing, onsite driftwood, trees, and vegetation as stabilization material to minimize disturbance and impacts. Reclamation would use nonreflective covers on the modified spillway.

Existing dispersed camping, day use, and unauthorized motor vehicle access near the north end of the reservoir have caused impacts on the environment, including visual quality, and contributed to substantial degradation of the terrestrial, nearshore, and aquatic resources. The proposed higher pool elevation could seasonally displace this dispersed recreation to adjacent areas during a portion years when the reservoir fills to the higher level, resulting in additional damage to new areas. To mitigate these impacts, Reclamation would take the actions outlined in Section 4.14.8 in coordination with the USFS. These mitigation measures are expected to restore the visual quality of the protected areas.

4.11 Air Quality

4.11.1 Methods and Impact Indicators

The impact analysis area for air quality is the area around the reservoir and downwind locations potentially affected by increased emissions or fugitive dust expected during the construction phase of the Proposed Action. The project area lies within Kittitas County, which is in attainment for criteria pollutants listed in the Clean Air Act (CAA) so Federal "general conformity" requirements do not apply. Therefore, the air quality analysis is limited to a qualitative evaluation of the construction and operational characteristics of the project and their potential to approach the general conformity *de minimis* thresholds as specified in 40 CFR 93.153. The analysis uses *de minimis* thresholds as the metric for identifying adverse environmental impacts. In attainment and maintenance areas, *de minimis* thresholds for all pollutants, except lead, are 100 tons per year; the *de minimis* threshold for lead is 25 tons per year. Table 4-16 lists air quality impact indicators and significance criteria.

Table 4-16. Air Quality Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Increased vehicle and equipment emissions and generation of fugitive dust during construction	Exceedance of EPA General Conformity *de minimis* thresholds
Exposure of sensitive receptors to substantial pollutant concentrations or odors	Exceedance of EPA General Conformity *de minimis* thresholds

4.11.2 Summary of Impacts

Under the No Action Alternative, reconstruction of the existing interim fish passage facilities and construction of the two YRBWEP Phase II conservation projects and permanent fish passage facilities would generate localized and short-term emissions of criteria pollutants and fugitive dust; however, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, construction would not result in significant air quality impacts. Negligible, long-term impacts on air quality would result from vehicle trips associated with the reintroduction of fish into the reservoir. No additional activities under the No Action Alternative would generate emissions as there would be no additional emissions-generating construction or operational activities at the reservoir.

For Alternatives 2 through 5, construction emissions would be minor and, with BMPs in place, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, construction would not result in significant air quality impacts. No sensitive receptor would be exposed to substantial concentrations of pollutants or odors under any of the alternatives. Placement of asphalt at Speelyi Beach would generate odors; however, the odors generated would dissipate over the course of a few days after the placement of the asphalt. Alternatives 2 through 5 would not generate emissions once construction is complete.

4.11.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, reconstruction of the existing interim fish passage facilities and construction of the two YRBWEP Phase II conservation projects and permanent fish passage facilities would generate localized and short-term emissions of criteria pollutants and fugitive dust (Reclamation, 2014d; Reclamation and Ecology, 2011b); however, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, construction would not result in significant air quality impacts. Fish reintroduction would involve a limited number of new vehicle trips when the portable raceways are installed and fish are transported to Cle Elum Reservoir. These vehicle trips would generate vehicle emissions that could affect air quality parameters such as carbon monoxide and nitrogen oxide. These vehicle trips would contribute incrementally to this existing source of air pollutants, but air quality conditions in the project area would remain largely unchanged and no exceedance of EPA General Conformity *de minimis* thresholds is anticipated. Thus, operations under the No Action Alternative would not result in significant air quality impacts

4.11.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.11.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Emissions from construction of the radial gate modifications would be minor and, with BMPs in place, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated; thus, construction would not result in significant air quality impacts. Trucks delivering materials to construction sites would generate exhaust emissions, but vehicle emissions readily disperse within a short distance from the vehicle.

Because Kittitas County is in attainment for all priority pollutants and the construction period would be short (6 to 9 months), vehicle emissions from trucks are not anticipated to cause exceedances of the NAAQS. To exceed the NAAQS during construction, a large number of vehicles would need to be operating at low speeds (or idling) for long periods of times (on the order of months), which is not anticipated.

Heavy trucks and construction equipment powered by gasoline and diesel engines would generate carbon monoxide (CO) and nitrogen oxides (NO_x) in exhaust emissions. These emissions would be temporary and limited to the immediate area surrounding the construction site. Reclamation does not expect the temporary use of heavy trucks and construction equipment to cause exceedance of the applicable NAAQS because there would be only a relatively small number of heavy trucks and other types of construction equipment in operation at any one time. The use of diesel construction equipment would result in a temporary increase in mobile source air toxics (MSAT) emissions, especially diesel particulate matter. However, all emissions from construction activities, including vehicle emissions such as CO, NO_x, and MSATs, and all emissions from temporary facilities, such as asphalt batch plants, would cease at the conclusion of construction.

The dam is not located near sensitive receptors such as residential properties or recreational facilities.

Operation

Operation of the modified gates would use electricity similar to the existing gates and would not generate new emissions or dust.

Increased Reservoir Pool

Operation

Inundation of additional areas around the reservoir would not cause air quality impacts. The Cle Elum Pool Raise Project would increase the inundated area for about 40 days per year in years with sufficient runoff. The additional inundation area would slightly increase the area of shoreline exposed when the reservoir is drawn down. The additional shoreline could increase the amount of windblown dust. The total new inundation area would be approximately 46 acres. However, shoreline materials are mostly stable and exposure to elements would be temporary (Section 4.3.4.3). Therefore, the increased reservoir pool would not cause air quality impacts and no exceedance of EPA General Conformity *de minimis* thresholds is anticipated.

4.11.4.2 Additional Storage Capacity for Instream Flow

Use of the additional storage capacity for instream flows would not affect air quality as no emissions-generating activities would be required to release the additional stored water.

4.11.4.3 Rock Shoreline Protection

Construction

Emissions from construction of rock shoreline protection would be minor and, with BMPs in place, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, construction would not result in significant air quality impacts. Construction activities would temporarily generate suspended particulate matter less than 10 or 2.5 microns in diameter (PM_{10} and $PM_{2.5)}$ mostly from dust and small amounts of other pollutants associated with earthwork activities. Trucks delivering materials to construction sites would generate exhaust emissions, but vehicle emissions readily disperse within a short distance from the vehicle. Trucks would haul riprap and other materials to the sites where Reclamation is installing protection measures. Most existing roads are paved and truck traffic would occur on existing roads, minimizing the potential for generating dust. Approximately 4,270 truck trips would be required, but trips would extend over approximately 5 years, reducing the truck trips to a maximum of approximately 900 per construction season. Construction emissions would vary from day to day, depending on the timing and intensity of construction. Most of the materials to be hauled to the site are located within 30 miles of the reservoir. Trucks would transport the materials along SR-903 or Lake Cle Elum Dam Road to and from I-90. Because Reclamation would install protection measures when the reservoir is drawn down, trucks may transport some materials and equipment over the dry reservoir shoreline. This could cause minor and temporary increases in fugitive dust. Dust emissions may be noticeable by recreational users and nearby residents. Because Kittitas County is in attainment for all priority pollutants and the construction period would be relatively short, Reclamation does not anticipate vehicle emissions from trucks to cause exceedances of the NAAQS. To exceed the NAAQS during construction, a large number of vehicles would need to be operating at low speeds (or idling) for long periods of times (on the order of months), which is not anticipated.

Heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO and NO_x in exhaust emissions. These emissions would be temporary and limited to the immediate area surrounding the construction site. Construction would occur approximately 3 miles south of Alpine Lakes Wilderness Area, a federally designated Class I area. However, Reclamation does not expect construction emissions to impact the area due to the distance, prevailing wind patterns, and the low level of emissions anticipated.

Emissions from construction sites would be exempt from air quality permitting requirements. However, contractors would be required to comply with WAC 173-400-040, using BMPs to minimize construction-related emissions.

Operation

Over the long term, the shoreline protection measures would stabilize the shoreline and reduce the potential for erosion and dust; therefore, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, operations would not result in significant air quality impacts.

4.11.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Air quality impacts from construction to raise the elevations of the saddle dikes and the right dam abutment would be similar to impacts from construction of rock shoreline protection, but with less vehicle emissions because fewer truck trips would be required and the material would come from a nearby borrow site. No exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, construction would not result in significant air quality impacts. The placement of asphalt at Speelyi Beach Day Use Area would generate odors; however, the odors generated would dissipate over the course of a few days after placement of the asphalt.

Operation

The additional riprap would stabilize shoreline erosion over the long term and reduce the potential for erosion and dust; therefore, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, operations would not result in significant air quality impacts.

4.11.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Air quality impacts from construction of shoreline protection at the USFS campgrounds, Salmon La Sac Road, and the west side of the reservoir would be similar to impacts from construction of rock shoreline protection, but with less vehicle emissions because fewer truck trips would be required. Reclamation would obtain the construction materials from both nearby borrow areas and an off-site quarry (approximately 30 miles away). No exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, construction would not result in significant air quality impacts.

Operation

Over the long term, the shoreline protection measures would stabilize the shoreline and reduce the potential for erosion and dust; therefore, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, operations would not result in significant air quality impacts.

4.11.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Emissions from construction of the aquatic habitat improvements would be minor as no powered equipment would be required for construction. The only source of emissions would be the negligible emissions resulting from transport of construction workers by boat to construction sites. Therefore, no exceedance of EPA General Conformity *de minimis* thresholds is anticipated and thus, construction would not result in significant air quality impacts.

Operation

The improved aquatic habitat would not affect air quality as no emissions-generating activities would be required.

4.11.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.11.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.11.4.1).

4.11.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.11.4.2).

4.11.5.3 Hybrid Shoreline Protection

Operation

Air quality impacts from construction of hybrid shoreline protection would be similar to impacts from construction of rock shoreline protection.

Construction

Over the long term, the soft shoreline protection measures would stabilize the shoreline and reduce the potential for erosion and dust.

4.11.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.11.4.4).

4.11.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.11.4.5).

4.11.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.11.4.6).

4.11.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.11.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.11.4.1).

4.11.6.2 Additional Storage Capacity for TWSA

Use of the additional storage capacity for TWSA would not affect air quality as no emission-generating activities would be required to release the additional stored water.

4.11.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.11.4.3).

4.11.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.11.4.4).

4.11.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.11.4.5).

4.11.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.11.4.6).

4.11.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.11.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.11.4.1).

4.11.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.11.6.2).

4.11.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.11.5.3).

4.11.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.11.4.4).

4.11.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.11.4.5).

4.11.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.11.4.6).

4.11.8 Mitigation Measures

Overall, existing air quality in the project area meets the national standards for criteria pollutants. The scope of construction in any one location is relatively limited, and the contractor would employ BMPs required by WAC 173-400-040 for construction activities. For these reasons, construction impacts on air quality would be temporary, relatively minor, and not expected to cause exceedances of national standards. Use of the following BMPs would reduce construction impacts:

- Complying with the BMPs required in WAC 173-400-040 (general standards for maximum emissions)
- Complying with applicable dust control policies and plans
- Spraying dry soil with water to reduce dust

- Using temporary ground covers
- Minimizing idling of equipment when not in use
- Maintaining equipment in food working order
- Minimizing trip distances
- Planning construction areas to minimize exposing areas of earth for extended periods
- Covering dirt and gravel piles
- Sweeping paved roadways to reduce mud and dust
- Replanting exposed areas as soon as possible after construction

4.12 Climate Change

4.12.1 Methods and Impact Indicators

The area of impact analysis for climate change is the Yakima River basin, including the Cle Elum River basin. The analysis of greenhouse gas (GHG) emissions considers that construction of the project elements would generate GHG emissions through truck shipments of materials to the project sites and use of construction equipment. The GHG emissions were estimated using Ecology guidance and emission factors from the Climate Registry[1]. Ecology presumes that GHG emissions of less than 25,000 metric tons per year are not significant (Ecology, 2011). Operation of the project would generate negligible emissions; therefore, this analysis does not discuss them in detail.

There are numerous gases in the atmosphere that are considered GHG emissions, including CO_2, methane (CH_4), and nitrous oxide (N_2O). For the purposes of analyzing the total GHG emissions generated by a project, it is useful to analyze all GHG emissions using a single unit known as carbon dioxide equivalent (CO_2e). For any quantity and type of GHG, CO_2e signifies the amount of CO_2 which would have the equivalent global warming impact. Reclamation assumed that the estimated GHG emissions generated would result from the use of diesel fuel, which has higher CO_2e emissions than gasoline. The three major GHGs emitted from diesel fuel are CO_2, CH_4, and N_2O, each of which is emitted at a fixed rate per gallon of diesel combusted (“emission factor” in Table 4-17). CH_4 and N_2O are converted into CO_2e by applying a second factor to reflect their global warming potential relative to that of CO_2. One unit of CH_4 warms the atmosphere at 21 times the rate of CO_2, and one unit of N_2O warms the atmosphere at 310 times the rate of CO_2. The calculated total of CO_2e emissions per one gallon of diesel fuel is 10.3074 kilograms/gallon (kg/gal), as shown in Table 4-17 (Climate Registry, 2013a and 2013b).

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[1] The Climate Registry is a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify, and publicly report GHG emissions into a single registry, which is used by EPA and Ecology.

Table 4-17. CO_2 Equivalents and Emission Factors per 1 Gallon of Diesel Fuel

Greenhouse Gas	Emission Factor[1] (kg/gal)	Global Warming Potential	CO_2 Equivalent Emission Factor[1] (kg CO_2e/gal)
Carbon dioxide	10.21	1	10.21
Methane	0.0008	21	0.0168
Nitrous oxide	0.00026	310	0.0806
		Total	10.3074

[1] The emission factor is the relationship between the amount of pollution produced for every 1 gallon of diesel fuel used. Emission factors from The Climate Registry (2013a, 2013b).

To calculate the total CO_2e emissions, Reclamation multiplied the volume of diesel fuel required for the project by the expected CO_2e GHG emissions per gallon consumed.

To calculate the GHG emissions from truck shipments, Reclamation estimated the number of trucks required for each project element, the distance each truck would be required to travel, and the fuel efficiency. For purposes of analysis, Reclamation used an upper bound of 200 miles per truck trip and a fuel efficiency of 8.0 miles per gallon. To calculate the GHG emissions from construction equipment, Reclamation estimated the amount of fuel required for each project element. Results of the calculations performed for each alternative are summarized in the following subsections.

Changes in precipitation, snowmelt, and runoff due to climate change could affect the project facilities and operations of the Proposed Action. The potential for these changes were evaluated using a climate change scenario and hydrologic modeling described in Section 3.12. As the climate change scenarios described in Section 3.12 would occur independently from the Proposed Action, there are no impact indicators that apply to this portion of the analysis. Rather, the described impacts on the project from climate change are in recognition that reservoir operations could change under the climate change scenarios.

Table 4-18 lists climate change impact indicators and significance criteria.

Table 4-18. Climate Change Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Production of GHG emissions	GHG emissions of greater than 25,000 metric tons per year
Ability of project to provide higher reservoir level to aid fish passage under predicted climate change	Reservoir elevation at 2,180 from April 1 to May 15
Ability of project to improve instream flows in the Cle Elum and Yakima rivers under predicted climate change	A measurable increase in Cle Elum River flow over current minimum levels of 220 cfs (180 cfs during years with low water supply) during winter would be a positive impact A measurable change in winter flows in the Yakima River would be a positive or negative impact A measurable increase in spring flows in the Cle Elum or Yakima rivers would be a positive impact A measurable increase in summer flows in the Yakima River below Sunnyside Dam would be a positive impact
Ability of the project to increase water supply in terms of deliveries to proratable water users under predicted climate change	An increase in water deliveries to proratable water users of 0.8 percent (contributing to the 70 percent of prorationing in drought years goal of the Integrated Plan)

4.12.2 Summary of Impacts

The No Action Alternative would generate conditions that do not differ from the current baseline conditions. The proposed construction projects would generate carbon emissions, but the level of those emissions would be far below Ecology's significance level. The project would not generate a high enough mass of carbon emissions to have an impact on climate change under Ecology and EPA guidelines.

Changes in runoff timing and volume associated with climate change would adversely impact the project. Under Alternatives 2 through 5, the enlarged reservoir capacity would fill less frequently. When the reservoir fills to the enlarged capacity, the additional storage capacity would allow water managers somewhat more flexibility to respond to the much larger adverse impacts of climate change on water supply and instream flow conditions. A positive benefit in winter instream flow or reservoir levels would result from Alternatives 2 and 3 under climate change conditions. Very little benefit to TWSA and water supply to proratable irrigation districts would result from Alternatives 4 and 5.

4.12.3 Alternative 1 – No Action Alternative

The No Action Alternative would not increase carbon emissions beyond those that currently occur. Construction associated with reconstructing the interim fish passage facilities and constructing the two YRBWEP Phase II conservation projects and the new permanent fish passage facilities would generate increased carbon emissions. However, the level of those emissions would be far below Ecology's significance level.

Section 3.12 describes the impacts of climate change on the project area under the No Action Alternative. Under the Adverse climate change condition, annual average inflow into the Cle Elum Reservoir would decrease by 8 percent, causing the reservoir to be 16 feet lower, on average, when compared to the baseline (no climate change) scenario. Figure 4-7 illustrates the No Action Alternative with and without climate change conditions. Climate change would affect the project area, and the No Action Alternative does not increase flexibility to adapt to these changes.

The effects of climate change could alter temperature and precipitation in the Yakima River basin and affect water management throughout the region. Changes in runoff and precipitation would require Ecology, Reclamation, and other agencies to adapt water management to respond to changing conditions as they occur. On average, the predicted reservoir elevation would be 16 feet lower under the effect of conditions assumed for the Adverse climate change scenario. In addition, the enlarged Cle Elum Reservoir would fill to capacity less frequently.

Climate change may also affect water-related resources in the overall Yakima River basin, including recreation, fish, wildlife, and surface water quality.

A number of climate change factors could affect the availability of water-related recreation in the Cle Elum watershed and the Yakima River basin, including changes in snowpack and changes in the timing and quantity of streamflow. Expected climate change would result in a decline in the quantity and quality of freshwater habitat for salmonid populations across Washington State (Mantua et al., 2010). Predicted increases in water temperature and thermal stress for salmonids in eastern Washington are minimal for the 2020s, but more severe later in the century (Mantua et al., 2010).

Based on projections for the 2040s, climate change may significantly alter the temperature, amount, and timing of runoff and fish habitat in the Yakima River basin. Average expected annual air temperature would increase, with accompanying increased water temperatures, and more precipitation would fall as rain rather than snow, according to studies conducted by the CIG (Reclamation and Ecology, 2011a). These temperature changes could affect fish in the Cle Elum watershed and the Yakima River basin, including the federally listed threatened fish species MCR steelhead and bull trout.

Climate change would have a direct impact on water temperature and indirect impact on dissolved oxygen. In general, an increase in air temperature caused by climate change would cause water temperatures to increase. In the upper Yakima River, climate change models predict that the number of weeks when average water temperatures exceed 21°C (69.8°F) may rise from less than 5 weeks under historical conditions to over 10 weeks in the 2040s (Mantua et al., 2009). Warmer water can hold less DO than cooler water, so DO would decrease as air and water temperatures increase due to climate change (Karl et al., 2009).

4.12.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

The construction activities proposed under Alternative 2 would generate approximately 1,400 metric tons of total CO_2e emissions. This level is well below the 25,000 metric ton significance threshold established by Ecology. Operations would generate negligible emissions under this alternative.

The effects of climate change could alter temperature and precipitation in the Yakima River basin and affect water management throughout the region. Changes in runoff and precipitation would require Ecology, Reclamation, and other agencies to adapt water management to respond to changing conditions as they occur.

Reclamation selected five scenarios for how the additional storage capacity would be used for instream flows, which are described in Section 4.2.4.2. The effect climate change would have on those instream flow scenarios is presented below.

4.12.4.1 Scenario 1 – Improve Winter Flows

Hydrologic modeling was performed for this scenario. The modeling results indicate that the additional storage capacity would be filled in 22 percent of the years, compared to 52 percent without climate change. Table 4-19 provides the starting and ending dates for additional storage capacity. The date that the reservoir level exceeds elevation 2,240 and when it drops back below that elevation is forecast to advance by 1 to 3 weeks compared to Scenario 1 without climate change (see Table 4-2 in Section 4.2.4.1). Figure 4-7 provides a comparison of Cle Elum Reservoir levels for No Action conditions and for climate change conditions with the Pool Raise Project.

Table 4-19. Starting and Ending Dates for Additional Storage, Alternative 2 Climate Change

Reservoir Level	Date		
	Average	Earliest	Latest
When reservoir level exceeds elevation 2,240	May 23	March 29	June 18
When reservoir level drops below elevation 2,240	June 23	May 22	July 20

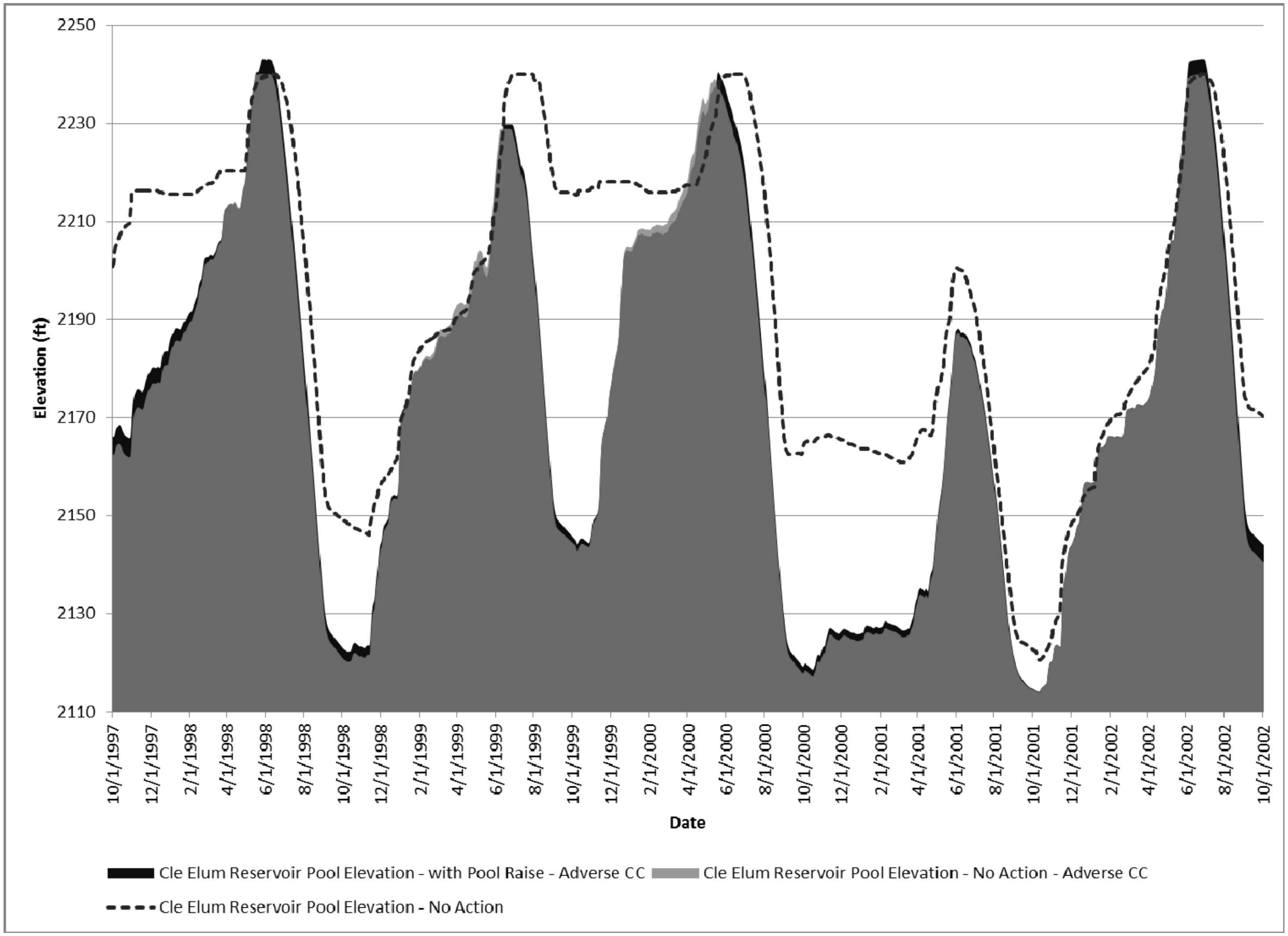

Figure 4-7. Cle Elum Pool Elevation –No Action with Climate Change compared to Alternative 2 with Climate Change

Figure 4-8 illustrates the outflow from Cle Elum Reservoir (equal to flow in the Cle Elum River) in a typical sequence of years (water years 1998 to 2002) for this scenario with climate change. The hydrograph for conditions without climate change is also plotted. The hydrograph shows flow contributions in the winter when water from the additional storage capacity is available. An estimate of the amount of time instream flows would be improved in winter was made using the results of the hydrologic modeling and are summarized in Table 4-20.

Table 4-20. Comparison of Winter Flow Exceedance for Alternative 2 Scenario 1

Alternative	Flow Exceedance	
	At or above 220 cfs (percent)	At or above 250 cfs (percent)
No Action	64.9	14.2
Alternative 2	67.8	41.0
No Action – Adverse Climate Change	14.1	2.7
Alternative 2, Scenario 1 – Adverse Climate Change	25.9	8.2

Hydrologic modeling predicts the Adverse climate change scenario would have a significant impact on winter instream flows in the Cle Elum River. The current minimum flow of 220 cfs would not be met as often. It is predicted that the 220 cfs flow would be met only 14 percent of the time from November to March under the No Action Alternative with Adverse climate change conditions, compared to 65 percent of the time under the No Action Alternative without climate change and 68 percent of the time under Alternative 2 without climate change. Alternative 2 with Adverse climate change conditions would increase the percentage of time 220 cfs would be met from 14 percent to 26 percent. A winter instream flow of 250 cfs would be met less than 3 percent of the time under the No Action Alternative with Adverse climate change. Alternative 2, Scenario 1 would improve that to 8 percent.

The primary benefit of increased winter instream flow would be improved salmonid overwintering habitat in the Cle Elum River. Scenario 1 would have a positive impact on winter flow in the Cle Elum River.

Flows would also increase in the Yakima River downstream from the confluence with the Cle Elum River. The most critical reach for winter flows is between Roza Dam and the Naches River. The additional instream flow in the Roza Reach would be a positive impact. In other reaches of the Yakima River, the additional flow would not be measureable and would have no impact.

There would be no change or impact to reservoir levels to aid fish passage, spring flow in the Cle Elum and Yakima rivers, summer flow in the Yakima River or TWSA and water supply with this scenario.

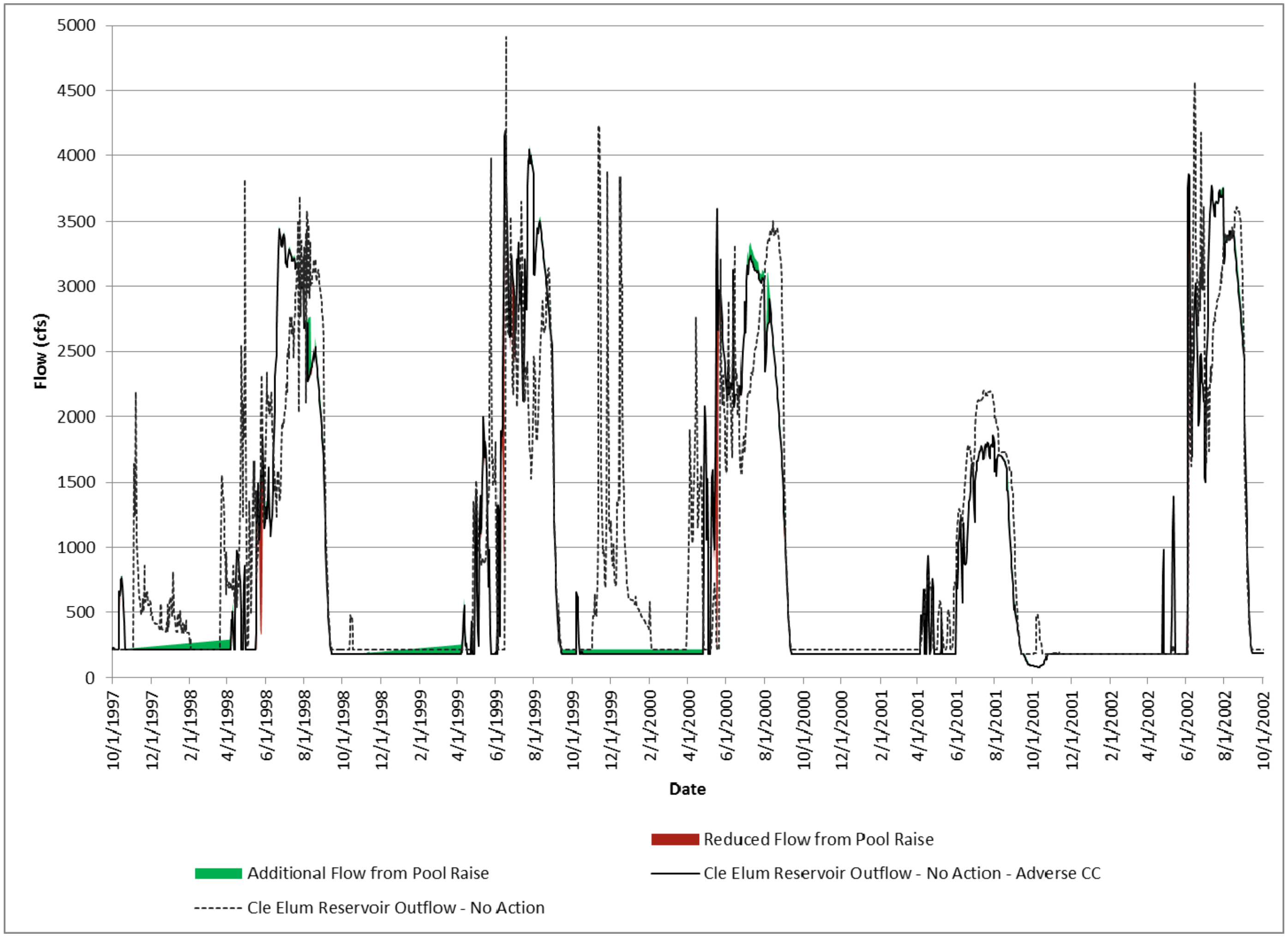

Figure 4-8. Outflow from Cle Elum Reservoir – No Action Alternative Compared with No Action Climate Change and Alternative 2 Climate Change

4.12.4.2 Scenario 2 – Improve Flow Conditions during Smolt Outmigration Period

For this scenario the additional storage capacity between elevation 2,240 and 2,243 would not be filled in the mid-March through May outmigration time period for kelts and smolts and additional flows would be released during that time period to aid in outmigration. Additional flows would be released when forecasts indicate there would be sufficient runoff to fill Cle Elum Reservoir to at least elevation 2,240. The additional flow volume released would be up to the 14,600 acre-feet that could be stored with the Cle Elum Pool Raise project. The flow would be released in a pulse or pulses to provide flow conditions more similar to an unregulated river during spring. The flow pulse would increase flows in the Cle Elum River to about 1,000 cfs at its peak (Thomas, 2015).

Hydrologic modeling performed for Scenario 1 estimates that in 22 percent of the years, an additional 14,600 acre-feet of storage would occur. In 18 percent of the years, some storage would be available for instream flows and in 60 percent of the years no additional storage would be available. Those percentages also indicate how often the additional water would be available for release to aid smolt outmigration.

The percentage increase in flow in the Cle Elum River using average flows is shown in Table 4-21 for mid-March through May. Table 4-21 shows average flows for no action, no action including Adverse climate change, and the percentage increase in time when a pulse would be available compared to the Adverse climate change average flows. Table 4-21 also shows the percent increase for the Yakima River reaches between the Cle Elum River and Roza Dam and between Roza Dam and the Naches River.

Table 4-21. Comparison of Flow Improvement during Smolt Outmigration Period for Alternative 2 Scenario 2

Alternative	Average Monthly Flow (cfs)			Percent Increase for pulse totaling 1,000 cfs
	March 15-31	April	May	
Cle Elum River				
No Action	379	608	885	13-260
No Action – Adverse Climate Change	228	428	735	36-440
Yakima River between Cle Elum River and Roza Dam				
No Action	2455	3093	3375	3-25
No Action – Adverse Climate Change	2326	2589	2711	9-33
Yakima River between Roza Dam and Naches River				
No Action	1239	1542	1664	7-50
No Action – Adverse Climate Change	1171	1157	1199	15-66

The potential increase in Cle Elum River flows during the smolt outmigration period would be 13 to 260 percent on average. During periods when the minimum release of 220 cfs is occurring, the increase would be 450 percent. This would be a significant benefit when water from the additional storage capacity is available. The percentage increase is also higher for climate change conditions than without, indicating the Cle Elum Pool Raise Project would be important contributor to spring flows when the storage is available.

Downstream in the Yakima River reach between Cle Elum River and Roza Dam, the percentage increase would be less (9 to 33 percent). The increase would have a positive impact. In the Yakima River reach between Roza Dam and Naches River, the additional flow would be a greater percentage than upstream (15 to 66 percent) and would be a positive impact when available.

There would be no change or impact to reservoir levels to aid fish passage, winter flow in the Cle Elum and Yakima rivers, summer flow in the Yakima River or TWSA and water supply with this scenario.

4.12.4.3 Scenario 3 – Increase Summer Flow in Lower Yakima River

For this scenario of instream flow use, the additional storage capacity would be released during summer to help adult sockeye and summer Chinook migrate from the Columbia River upstream on the Yakima River. Water would be released in a pulse or pulses and would be timed to coincide with cool temperature periods when river temperatures are acceptable to fish. The size and duration of pulse would be variable and would likely use 4,000 to 7,000 acre-feet to achieve its goal of aiding fish migration (Hubble, 2015).

No analyses were performed for this scenario. However, climate change would have a direct impact on water temperature affecting the likelihood of success of this scenario. In general, an increase in air temperature caused by climate change would cause water temperatures to increase. In the upper Yakima River, climate change models predict that the number of weeks when average water temperatures exceed 21°C (68.9°F) may rise from less than 5 weeks under historical conditions to over 10 weeks in the 2040s (Mantua et al., 2009). As air temperatures increase, the potential for a cool temperature period that can cool the Yakima River sufficiently enough to aid in adult migration may decrease. No positive or negative impact to summer flows and temperature in the Yakima River would likely occur. There would be no change or impact to reservoir levels to aid fish passage with this scenario.

4.12.4.4 Scenario 4 - Carryover for Fish Passage

For this scenario of instream flow use, Reclamation would retain water in the additional storage capacity, but not release it for instream flows (a process called "carryover storage"). The higher reservoir level created by the retained water would increase the length of time during which outmigrating juvenile salmon could use the proposed Cle Elum fish passage facilities, in part by allowing earlier operation than would otherwise be the case. The design of the facility allows passage when reservoir levels are greater than elevation 2,180. The target date to reach that operating level so as to provide downstream passage for smolts is April 1. Under conditions of the No Action Alternative with climate change, that level would be reached by April 1 in 60 percent of the years. In the other years, the corresponding date would be April 26, on average. The modeling indicates that in one year, elevation 2,180 was not reached. For this scenario and in the years when the water in the additional storage capacity would be carried over, elevation 2,180 would be reached 2 to 18 days earlier, with an average improvement of 6 days earlier. This scenario would have a positive impact on reservoir levels to aid fish passage out of Cle Elum Reservoir.

There would be no change or impact to winter or spring flow in the Cle Elum and Yakima rivers, summer flow in the Yakima River or TWSA and water supply with this scenario.

4.12.4.5 Scenario 5 – Combination of Scenarios 2 through 4

For this scenario of instream flow use, the water in the additional storage capacity would be carried over in whole or in part to aid in downstream fish passage. Once the necessary fish passage elevation has been reached, the stored water would be released to increase instream flow for outmigrants in mid-March through May or for increased instream flow during summer to aid adult salmon migrating from the Columbia River into the Yakima River. This scenario provides flexibility in using the additional storage capacity and allows Reclamation the opportunity to tailor flow releases to meet fish needs for that year.

The additional storage capacity used for instream flow releases for this scenario would range from 0 to 14,600 acre-feet from mid-March through May and the remainder of the storage up to 14,600 acre-feet would be used in summer or carried over to the next year. The increase in flow in the Cle Elum and Yakima rivers during the mid-March through May time period would range up to an average of 96 cfs. The volume of flow release during late summer to aid fish migration in the lower Yakima River would range from 0 to 7,000 cfs.

This scenario would have a positive impact on Cle Elum Reservoir water levels and would have positive impacts on spring (mid-March through May) flows in the Cle Elum River and Yakima River and on summer flows in the lower Yakima River. The benefits from each would be less than in the scenarios where the additional storage capacity is used for a single purpose. No change or impact to Cle Elum River or Yakima River winter flows would result from this scenario. No change or impact to TWSA and water supply would occur with this scenario.

4.12.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

The construction activities proposed under Alternative 3 would generate approximately 385 metric tons of total CO_2e emissions. Similar to Alternative 2, this level is well below the 25,000 metric ton significance threshold established by Ecology. Operations would generate negligible emissions under this alternative.

The impacts on the project from climate change are the same as discussed under Section 4.12.4 for Alternative 2.

4.12.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

The construction activities proposed under Alternative 4 would generate approximately 1,200 metric tons of total CO_2 emissions. Similar to Alternative 2, this would be well below the 25,000 metric tons significance threshold established by Ecology. Operations would generate negligible emissions under this alternative.

The impacts on the project from climate change are similar to those discussed under Section 4.12.4 for Alternative 2, but use of additional storage capacity for TWSA would provide Reclamation with greater flexibility in responding to climate change-induced water shortages for proratable water users. Conversely, if Reclamation uses the additional storage capacity to improve proratable water users, Reclamation would not be able to solely use it to help meet instream flows, which could otherwise slightly offset the adverse impact of climate change on instream flow and fish habitat.

For Alternative 4, Reclamation would manage the additional storage capacity as part of TWSA, for potential use by proratable irrigation districts and for instream flows. Reclamation anticipates that the primary use of the additional storage capacity would be to supply proratable irrigation districts during drought years. Although water allocated to TWSA could be used for instream flows, assuming that it would be used to supply proratable irrigators represents a “worst-case” fish scenario in this EIS analysis.

Hydrologic modeling performed for this alternative indicates that the existing full reservoir elevation of 2,240 would be exceeded in about 40 percent of the years modeled and that the proposed reservoir elevation of 2,243 would be reached in about 22 percent of the years modeled. On average, reservoir levels would exceed elevation 2,240 on June 1 and stay above that level until July 10 in the years with sufficient runoff to fill the reservoir above elevation 2,240. The average length of time the reservoir elevation would be above 2,240 is about 33 days in the years when runoff is sufficient to fill the pool above that elevation. Table 4-22 lists the starting and ending dates when the additional storage would occur. The additional storage would fill above elevation 2,240 earlier, by 1 day on average, compared to Alternative 2. Reclamation would hold the reservoir level above elevation 2,240 for 0 to 2 days longer under Alternative 4 than under Alternative 2. Figure 4-9 illustrates the reservoir pool elevation in a typical sequence of years for this alternative. There would be no change or impact to reservoir levels to aid fish passage with this scenario.

Table 4-22. Starting and Ending Dates for Additional Storage, Alternative 4 Climate Change

Reservoir Level	Date		
	Average	Earliest	Latest
When reservoir level exceeds elevation 2,240	May 22	March 29	June 18
When reservoir level drops below elevation 2,240	June 23	May 22	July 20

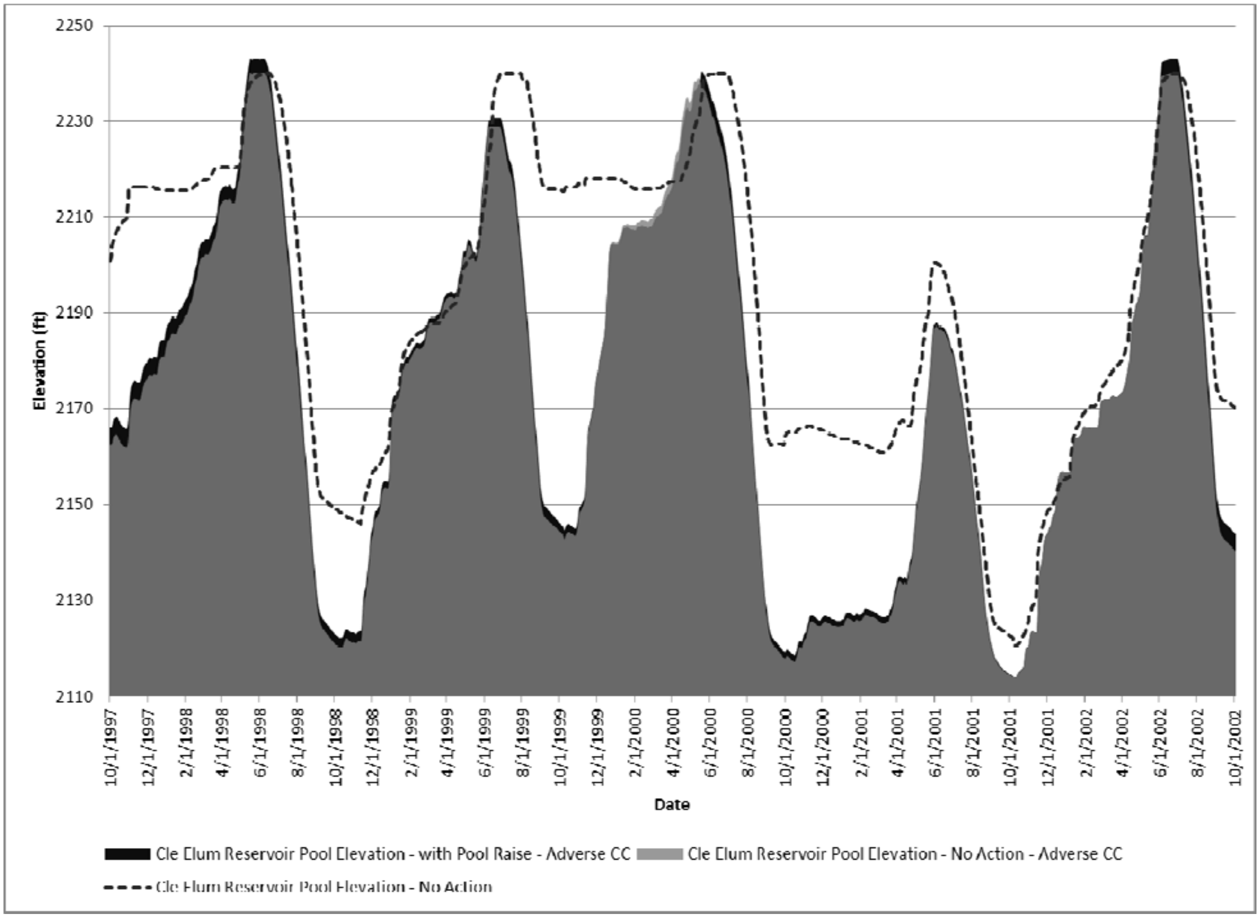

Figure 4-9. Cle Elum Pool Elevation – No Action with Climate Change Compared to Alternative 4 with Climate Change

Hydrologic modeling performed for this alternative also analyzed and compared TWSA and prorationing levels for the No Action Alternative, the No Action Alternative with climate change and Alternative 4 with climate change. With the No Action Alternative under climate change, modeling results predict 48 percent of the years would have a September 30 prorationing level below 70 percent. For the No Action Alternative under current climate conditions, 19 percent of the years have a September 30 proration level below 70 percent. The September 30 prorationing level is a measure of the percentage of water right entitlements supplied to proratable irrigation districts during the irrigation season, which ends in early October. A goal of the Integrated Plan is to provide a water supply of 70 percent of entitlements to proratable irrigation districts during drought years. The hydrologic modeling predicts a maximum increase, compared to the No Action Alternative with climate change, of 1.8 percent in the entitlement supplied by September 30 to proratable users during drought years with Alternative 4. The average increase in prorationing levels in drought years would be 0.14 percent. The increase in all years with prorationing levels less than 100 percent would be 0.48 percent. Table 4-23 lists the average TWSA and September 30 prorationing level for the period of record modeled, which is 1926 to 2009.

Table 4-23. TWSA and Prorationing Levels – Climate Change with No Action Alternative and with Alternative 4

TWSA and Prorationing Levels (Average of 1926-2009 Time Period)	
April 1 TWSA	acre-feet
No Action Alternative (modeled)	3,030,000
No Action Alternative with Climate Change (modeled)	2,493,000
Alternative 4 with Climate Change (modeled)	2,497,000
September 30 Prorationing Level	percent of entitlement
No Action Alternative (modeled)	87.9
No Action Alternative with Climate Change (modeled)	66.4
Alternative 4 with Climate Change (modeled)	66.8
Difference between Alternative 4 with Climate Change and No Action Alternative with Climate Change (modeled)	0.48[1]

[1]Average includes years from 0.0 to less than 100 percent proration level

The proratable water users that would benefit from an increase in water supply provided by this project include the Kittitas Reclamation District, Roza Irrigation District, Wapato Irrigation Project, and to a lesser extent, the Kennewick Irrigation District and other proratable water users. An increased storage capacity would increase reliability for irrigators in these districts. However, the change in water supply for Alternative 4 with climate change would not be measureable in most drought years and no positive impact would occur.

Figure 4-10 illustrates the outflows from the reservoir for the No Action Alternative and Alternative 4. The figure shows slightly increased flows during the summer when Reclamation releases water from the additional storage capacity for instream flow or for water supply for proratable irrigation districts.

The additional release to the Cle Elum River during summer has the potential to exacerbate existing high flow problems. However, potential issues would be minimized because the water would be released during drought years when flows would be lower than normal. At the time the additional storage is released, flow in the Cle Elum River would remain within its operating range and no impact to the Cle Elum River would occur. Downstream along the Yakima River, the additional flow would also remain within its operating range and no impact would occur.

There would be no change or impact to reservoir levels to aid fish passage, spring flow in the Cle Elum and Yakima rivers, summer flow in the Yakima River with this scenario.

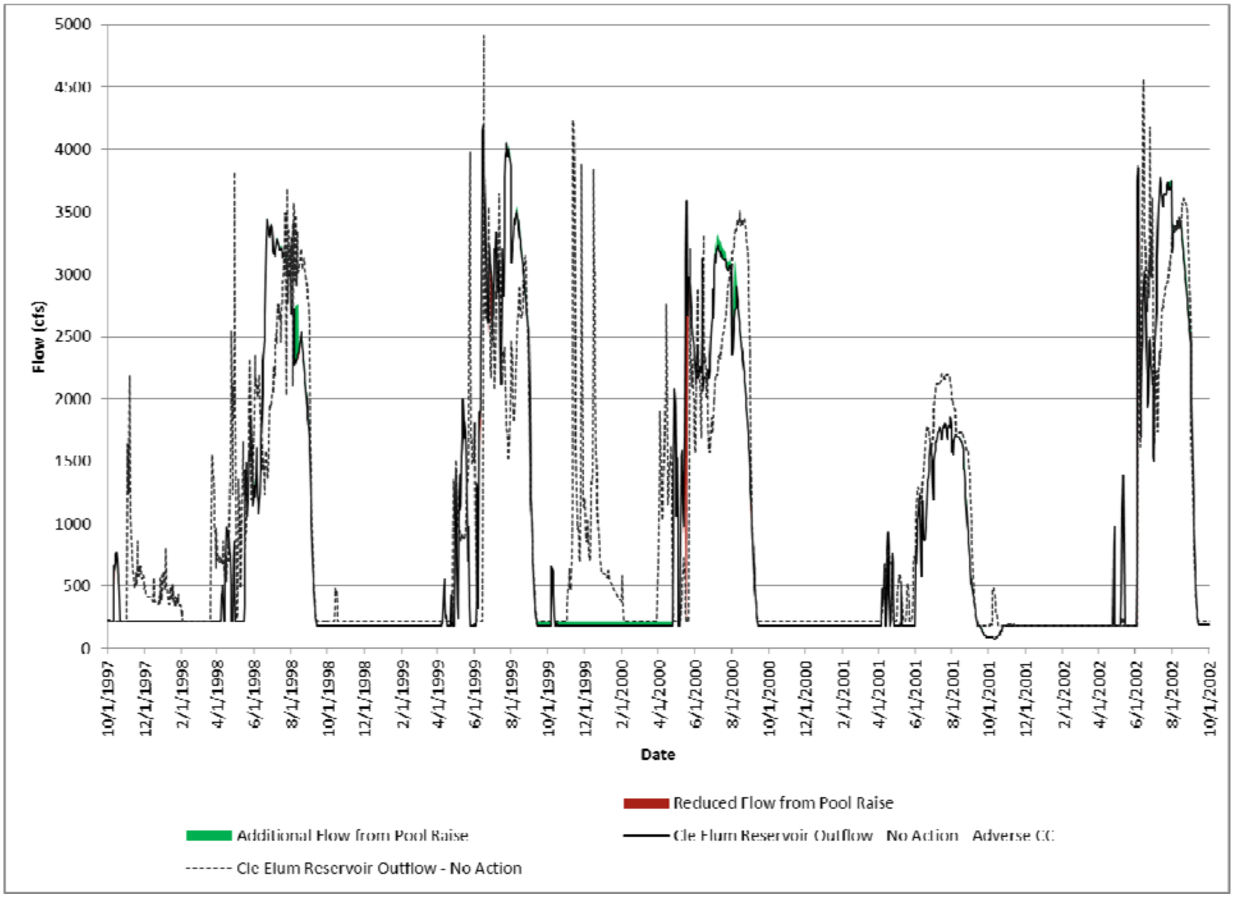

Figure 4-10. Outflow from Cle Elum Reservoir – No Action Alternative Compared with No Action Climate Change and Alternative 4 Climate Change

4.12.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

The construction activities proposed under Alternative 5 would generate approximately 160 metric tons of total CO_2e emissions. Similar to Alternative 2, this level is well below the 25,000 metric ton significance threshold established by Ecology. Operations would generate negligible emissions under this alternative.

The impacts on the project from climate change are similar to those discussed under Section 4.12.4 for Alternative 2, but use of additional storage capacity for TWSA would provide Reclamation with greater flexibility in responding to climate change-induced effects on water supply.

4.12.8 Mitigation Measures

The project would not generate carbon emissions at a level above Ecology and EPA’s threshold for significance. Therefore, there is no need for mitigation.

4.13 Noise and Vibration

4.13.1 Methods and Impact Indicators

The area of impact analysis for noise and vibration is the locations around the reservoir potentially affected by increased noise, especially those areas with sensitive receptors (see Section 3.13). This analysis used standard information about noise levels from typical construction equipment to present a qualitative discussion of short-term changes in noise during construction. Impacts could result from exposure to ground-borne vibration; exceedance of the maximum permissible noise levels presented in Table 3-12; or violations of noise standards associated with construction of the Cle Elum Pool Raise Project facilities. Quantitative noise modeling was not conducted because construction noise is exempt from regulation for activity conducted between 7 a.m. and 10 p.m. (daytime hours) per WAC 173-60-050. In addition, noise created by traffic (including heavy construction vehicles) on public roads is exempt from regulation under WAC 173-60-050. Furthermore, no operational noise would be generated by the project. However, the analysis considers the noise generated during construction and compares it to the noise levels presented in Table 3-12 to provide context for the levels of noise expected.

Table 4-24 lists impact indicators and significance criteria for noise and vibration.

Table 4-24. Noise and Vibration Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Construction noise exceeding maximum permissible environmental noise levels	Continuous construction noise at a sensitive receptor that would exceed 90 dBA
Operation noise exceeding maximum permissible environmental noise levels	Increase in noise above maximum permissible environmental noise levels (above 55 dBA for residential and recreational uses)
Exposure to ground-borne vibration resulting from construction	Construction activities that produce vibration levels that are disruptive to humans or damaging to structures

The analysis of potential noise generated during construction is based on noise levels of typical construction equipment at 50 feet from the source (Table 4-25). Depending on the activity, peak noise levels from equipment shown in Table 4-25 would range from 76 to 110 dBA at 50 feet from the source. However, noise levels decrease with distance from the source at a rate of approximately 6 to 7.5 dBA per doubled distance, so noise levels farther from construction activities would be lower than those listed in Table 4-25. In general, soft site conditions exist in the reservoir area, which means that noise levels would be an additional 7.5 dB less per doubling of distance. An additional 10 dB decrease from dense vegetation would further reduce noise levels. For example, at 200 feet from the noise source, noise levels from construction equipment would range from 64 to 96 dBA.

Table 4-25. Construction Equipment Average Maximum Noise Level (L_{max})

Equipment	Examples	Actual Measured Average L_{max}[1] at 50 feet (dBA)
Earth moving	Compactors	83
	Front end loader	79
	Backhoe	78
	Tractors	84
	Graders	89
	Pavers	77
Materials handling	Concrete mixer truck	79
	Concrete pump truck	81
	Crane	81
Stationary	Pumps	81
	Compressors	78
	Generators	81
Hauling	Dump truck	76
Impact equipment	Pile drivers	110
Sand blasting	Sand blasters	96

Source: Washington State Department of Transportation measured data; FHWA, 2006.
[1]Lmax is the maximum value of a noise level that occurs during a single event.

Construction activities have the potential to produce vibration levels that may be annoying or disturbing to humans and damage nearby structures. These activities include using jackhammers and soil compacting machinery. Measurements of vibration are expressed in terms of the peak particle velocity (PPV), the maximum velocity experienced by any point in a structure during a vibration event. It is an indication of the magnitude of energy transmitted through vibration. PPV is an indicator often used in determining potential damage to buildings from stress associated with blasting and other construction activities. It is measured in inches per second (in/sec).

Table 4-26 summarizes the levels of vibration and the usual effect on people and buildings based on the U.S. Department of Transportation guidelines. Table 4-27 presents the vibration levels for typical construction equipment used to assess potential vibration impacts from the project. There are no regulatory guidelines for assessing impacts from vibration; however, for purposes of this analysis, impacts would occur if sustained vibration would cause building damage or would be unpleasant for people (typically above 3.0 in/sec).

Table 4-26. Summary of Vibration Levels and Effects on Humans and Buildings

Peak Particle Velocity (in/sec)	Effects on Humans	Effects on Buildings
<0.005	Imperceptible	No effect
0.005 to 0.02	Barely perceptible	No effect
0.02 to 0.05	Level at which continuous vibrations begin to annoy people in buildings	No effect
0.05 to 0.5	Vibrations considered unacceptable for people exposed continuously or on A long-term basis	Minimal potential for damage to weak or sensitive structures
0.5 to 1.0	Vibrations considered bothersome by most people, however tolerable if short-term in length	Threshold at which there is a risk of architectural damage to buildings with plastered ceilings and walls; some risk to ancient monuments and ruins
1.0 to 2.0	Vibrations considered unpleasant by most people	U.S. Bureau of Mines data indicate that blasting vibration in this range would not harm most buildings; most construction vibration limits are in this range
>3.0	Vibration is unpleasant	Potential for architectural damage and possible minor structural damage

Source: Hajek et al., 2006

Table 4-27. Vibration Levels for Typical Construction Equipment

Equipment		PPV at 25 feet (in/sec)
Pile driver (impact)	Upper range	1.518
	Typical	0.644
Pile driver (sonic)	Upper range	0.734
	Typical	0.170
Large bulldozer		0.089
Loaded truck		0.076
Small bulldozer		0.003
Vibratory roller		0.210
Jackhammer		0.035

Source: FTA, Transit Noise and Vibration Impact Assessment, May 2006

4.13.2 Summary of Impacts

Construction activities associated with the No Action Alternative would cause minor increases in noise. Reclamation would reconstruct the existing interim fish passage facilities and construct two YRBWEP Phase II conservation projects and the new permanent fish passage facilities. Noise associated with excavation, construction, and hauling would be the most noticeable impacts. The increase in noise would be temporary, localized and limited to daytime hours. Operation of the interim fish passage facilities and the permanent fish passage facilities would not generate noise. Transport of fish as part of the ongoing fish reintroduction would generate negligible noise from vehicle operations (approximately 10 vehicles per year). The YRBWEP Phase II project would not generate noise once construction is complete. Overall, noise and vibration levels would be similar to those currently experienced in the area.

Noise impacts from Alternatives 2, 3, 4, and 5 would be similar to one another and cause temporary increases in noise that would exceed the maximum allowable noise levels described in Table 3-12. However, the increase in noise would be temporary and limited to the construction period and would not exceed 90 dBA at sensitive receptors; therefore, it would not be significant. Perceptible vibration under all four action alternatives would result from trucks operating on roadways and from soil compaction activities; however, the vibration would be temporary and limited to daytime hours. None of the alternatives would generate long-term noise or vibration.

4.13.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, Reclamation would reconstruct the existing interim fish passage facilities and construct two YRBWEP Phase II conservation projects and the new permanent fish passage facilities. Noise associated with excavation, construction, and hauling would be the most noticeable impacts. The increase in noise would be temporary, localized and limited to daytime hours. Construction of the permanent fish passage facilities would occur during 7 months each year of the 3-year construction period. Noise impacts would be concentrated close to the dam where few people recreate and there are no residences. Therefore, noise impacts would not be significant. Operation of the interim fish passage facilities and the permanent fish passage facilities would not generate noise. The approximately 10 vehicle trips per year to transport fish as part of the ongoing fish reintroduction project would generate negligible noise (Reclamation and Ecology, 2011b). The completed YRBWEP Phase II project would not generate noise. Overall noise and vibration levels would be similar to those currently experienced in the area.

4.13.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.13.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction to modify the spillway radial gates would cause temporary increases in noise in the immediate vicinity of the dam that exceed the maximum allowable noise levels described in Table 3-12. However, the increase in noise would be temporary and limited to the construction period and would not exceed 90 dBA at sensitive receptors; therefore, it would not be significant. Construction equipment would be limited to a small number of trucks to deliver the new gates. The major noise source would be from sandblasting the radial gates. The expected maximum noise of the construction equipment used is 81 dBA at distance of 50 feet from the source. The dam site is isolated from residential and recreational areas, so few people would experience the construction noise. Construction duration would be short and limited to one dry season. Furthermore, construction noise would occur between the permissible hours of 7 a.m. and 10 p.m. and would usually end at 5 p.m. Therefore, there is no anticipated violation of any noise standards and no significant impacts would be anticipated.

Reclamation does not expect sand blasting to generate perceptible vibration levels; trucks delivering materials to the construction site would generate vibration levels of 0.076 in/sec at 25 feet from the source. At this level, the vibrations would be perceptible as trucks drive along roadways, but the temporary nature of the source would limit adverse effects. Reclamation anticipates no vibration levels that would have effects on buildings or would be disruptive to humans; therefore, no significant impacts are anticipated.

Operation

The modified spillway gates would operate similar to existing conditions and would not cause additional noise or vibration during operation.

Increased Reservoir Pool

There would be no increased noise or vibration associated with inundating additional areas around the reservoir.

4.13.4.2 Additional Storage Capacity for Instream Flow

Use of the additional storage capacity for instream flow would not result in any changes to noise or vibration levels in the project area because the release of water from the radial gates would not generate new noise.

4.13.4.3 Rock Shoreline Protection

Construction

Installation of rock shoreline protection measures would require earth moving activity and materials hauling. Construction would cause temporary increases in noise that exceed the maximum allowable noise levels described in Table 3-12. Construction noise would be temporary, localized, and limited to daytime hours and would not exceed 90 dBA at sensitive receptors; therefore, no significant impacts are anticipated. The expected combined noise level of all construction equipment (e.g., soil compactor, excavator, backhoe, dump truck) operating together during installation of shoreline protection would be 84 dBA at distance of 50 feet from the source, which is the approximate distance that the closest receptor would be to the construction area. Furthermore, construction noise would occur between the permissible hours of 7 a.m. and 10 p.m. and would generally end at 5 p.m. Therefore, there is no anticipated violation of noise standards and Reclamation anticipates no significant noise impacts.

Construction vibration would be temporary, localized, and limited to daytime hours. Soil compaction would create the highest vibration levels, with levels anticipated at 0.210 in/sec at 25 feet from the source. At this level, if exposure were continuous or of long duration, Reclamation would consider the vibrations unacceptable. However, since the soil compaction activities would be temporary, localized, and limited to daylight hours, Reclamation anticipates minor effects. The agency anticipates no vibration levels that would have effects on buildings or would be disruptive to humans; therefore, no significant impacts are anticipated.

Truck trips would also cause noise and vibration during construction. Approximately 4,270 truck trips would be required, spread out over approximately 5 years of drawdown seasons, reducing the number of trips at any one time. Truck trips would occur only during daylight hours. Trucks delivering materials to the construction site would generate vibration levels of 0.076 in/sec at 25 feet from the source. At this level, the vibrations would be perceptible as trucks drive along roadways, but the temporary nature of the source would limit any adverse effects.

The increased noise and vibration would be most noticeable to residents of the properties near the installation site. In some of the locations where shoreline protection is proposed, the closest property is 50 feet from the construction site. People recreating near the construction area would also be subject to construction noise and vibration. Construction would only occur during daylight hours and would be limited in duration and would not exceed 90 dBA at any sensitive receptor; therefore, expected impacts are minor. Construction duration for any single shoreline protection project would be short and contained within one dry season, but cumulatively, projects could extend over several years. Noise and vibration at the staging areas would be limited to the operation of trucks carrying materials to and from the construction site and would be limited in duration; therefore, Reclamation anticipates no significant noise impacts.

Operation

The completed rock shoreline protection would not cause additional noise or vibration once construction is complete.

4.13.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Noise and vibration impacts for raising the elevation of the saddle dikes and right dam abutment would be similar to those described for rock shoreline protection in Section 4.13.4.3.

Operation

The completed facilities would not cause additional noise once construction is complete.

4.13.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Noise and vibration impacts for construction of rock shoreline protection at Cle Elum River Campground, Wish Poosh Campground, and Salmon La Sac Road would be similar to those described for the rock shoreline protection in Section 4.13.4.3. Because the facilities and road are not located near residential areas, construction noise would affect few people. Construction in the campgrounds would occur in the fall when the campgrounds are closed and recreation use of the reservoir decreases. Therefore, the noise impacts on recreation users would be minimal.

Noise from construction of the shoreline stabilization on the west shore would be minimal as no powered heavy equipment would be required for construction. The only noise would result from transport of construction workers by boat to construction sites and that would be negligible. No construction noise exceeding 90 dBA would be anticipated; therefore, no significant impacts are anticipated.

Operation

The completed rock shoreline protection would not cause additional noise or vibration when completed.

4.13.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Noise from construction of the aquatic habitat improvements would be minimal as no powered heavy equipment would be required for construction. The only noise would result from transport of construction workers by boat to construction sites and that would be negligible. No construction noise exceeding 90 dBA would be anticipated; therefore, no significant impacts are anticipated. No activities that would generate ground-borne vibration during construction are anticipated.

Operation

The improved aquatic habitat would not cause additional noise or vibration as no noise- or vibration-generating activities would be required.

4.13.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.13.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.13.4.1).

4.13.5.2 Additional Storage Capacity for Instream Flow

Use of the additional storage capacity for instream flow would not result in any changes to noise levels in the project area.

4.13.5.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.13.4.3).

4.13.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.13.4.4).

4.13.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.13.4.5).

4.13.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.13.4.6).

4.13.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.13.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.13.4.1).

4.13.6.2 Additional Storage Capacity for TWSA

Use of the additional storage capacity for TWSA would not cause noise impacts.

4.13.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.13.4.3).

4.13.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.2.13.4).

4.13.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.13.4.5).

4.13.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.13.4.6).

4.13.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.13.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.13.4.1).

4.13.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.13.6.2).

4.13.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.13.5.3).

4.13.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.13.4.4).

4.13.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.13.4.5).

4.13.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.13.4.6).

4.13.8 Mitigation Measures

The project would comply with applicable noise regulations by restricting construction activities to daytime hours. Although not required, Reclamation would implement BMPs to reduce construction noise to the extent feasible. Measures to reduce noise and limit human activity would be incorporated for project activities that are near high-quality habitats such as old-growth or riparian zones. Reclamation would include limiting construction hours and regular notification to affected property owners. The following measures would be implemented to further reduce construction noise impacts:

- Using broadband back-up alarms and designing site access to minimize the need for backing up trucks
- Using equipment with mufflers or noise control
- Situating noise-generating equipment away from houses or other sensitive receivers
- Keeping heavy equipment maintained to minimize noise to the greatest extent feasible

4.14 Recreation

4.14.1 Methods and Impact Indicators

The area of impact analysis for recreation is the Cle Elum Reservoir, the Cle Elum River above and below the reservoir, the shorelines, and the adjacent upland areas where recreation resources and activities could be affected by the project. Reclamation analyzed potential short-term impacts by identifying construction activities that could temporarily limit, disrupt, or displace recreation facilities or activities in the study area. Long-term impacts were evaluated by identifying project components, shoreline protection measures, and operational conditions that could seasonally or permanently limit, disrupt, or displace recreation facilities or activities. Adverse impacts are changes that would diminish public or private recreational use of or access to developed recreation sites and dispersed recreation areas in the study area. Table 4-28 lists impact indicators and significance criteria for recreation.

Table 4-28. Recreation Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Loss of developed recreational facilities	Temporary closures of developed recreational facilities for more than 3 weeks during the peak recreation season or over Memorial Day, Independence Day or Labor Day Permanent loss of developed facilities, or inundation that displaces a recreational use that is not accommodated with similar availability elsewhere at Cle Elum Reservoir
Quality of recreation	Reduction of quality of recreation at developed, dispersed, or private sites due to construction activities such that users avoid the sites
Access to private recreation	Permanent loss of private access to the reservoir shoreline that is not fully mitigated
Loss of dispersed recreation	Temporary closures of areas used for dispersed recreation for more than 3 weeks during the peak recreation season or over Memorial Day, Independence Day or Labor Day Permanent loss or inundation of areas used for dispersed recreation that is not accommodated with similar availability elsewhere at Cle Elum Reservoir

4.14.2 Summary of Impacts

The No Action Alternative would not result in adverse impacts on recreation because there would be no changes to the reservoir, its operation, or recreation facilities. Impacts from reconstruction of the interim fish passage facility and construction of permanent fish passage facilities are expected to be minor. No recreation facilities would be disrupted and public access near the dam is limited. The two conservation projects proposed as part of YRBWEP Phase II are located in developed agricultural areas and would not affect recreation. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial degradation of the terrestrial, nearshore, and aquatic environments.

Impacts on recreation from Alternatives 2 through 5 would be similar to one another. All four alternatives would cause temporary adverse impacts on developed recreation facilities at Speelyi Beach Boat Launch and Day Use Area and on the associated dispersed recreation activities at Speelyi Beach due to closures and disruption during construction of shoreline protection measures. These impacts would not be significant because they would be short term and would occur after Labor Day when recreational use of these areas is reduced. Once construction is complete and mitigation measures are fully implemented, the higher reservoir pool levels would not impact access to or use of developed recreation facilities, and shoreline protection measures at these recreational facilities would continue to protect them from erosion or wave damage.

In years when the additional storage capacity is used, the increased inundation from the higher reservoir level would generally start in early June and extend to early July, lasting for approximately 40 days (Table 4-2). Areas that would be inundated include dispersed recreation areas at Dry Creek, Morgan Creek, and French Cabin Creek. Figure 2-4 shows the extent of inundation in these areas. Some portions of the dispersed recreation areas may remain accessible to recreation users, but most camping would be displaced during the period of the higher reservoir level. Dispersed camping would be available in other areas around the reservoir and would be available at Dry Creek, Morgan Creek, and French Cabin Creek later in the season when the reservoir level drops. Because the loss of dispersed camping would not be permanent, and other opportunities are available nearby, impacts to dispersed camping would be negative, but not significant.

Opportunities to launch small watercraft along the east bank of the Cle Elum River downstream from the NF-4308 bridge would be reduced due to seasonal inundation, but the impact would not be significant because other boat launch locations are expected to remain available in the same general area. Inundation would not limit use of the Cle Elum River upstream from the NF-4308 bridge for whitewater rafting or kayaking.

Installation of shoreline protection measures on private property could make access to shorelines more difficult. It cannot be determined at this time if any permanent loss of existing private access to the reservoir shoreline would occur that would not be fully mitigated. If there are changes in the project that could result in permanent loss of existing private access to the reservoir shoreline, then Reclamation will conduct the appropriate environmental review and compliance to identify and address the potential for significant adverse effects prior to the undertaking.

4.14.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, water-oriented developed and dispersed recreation would continue to be a major use at and around Cle Elum Reservoir. Public demand for motorized and nonmotorized recreational access to rivers, reservoirs, forestlands, and winter recreation areas in the Yakima River basin would continue to increase as population grows. Ongoing dispersed camping and day use activities near the north end of the reservoir in the Dry Creek, Morgan Creek, and French Cabin Creek areas would continue to cause substantial degradation of the terrestrial, nearshore, and aquatic environments associated with impacts on earth, surface water quality, vegetation and wetlands, wildlife, and visual quality as described in Sections 4.3.3, 4.4.3, 4.7.3, 4.8.3, and 4.10.3. These impacts would likely gradually deteriorate users' recreation experiences as resource damage continues.

Reconstruction of the interim fish passage facilities and construction of the new permanent fish passage facilities would cause minor traffic delays and short-term disruptions to the solitude of anglers, hikers, and dispersed campers within sight and sound of the construction areas. Impacts are expected to be minor because public access near the dam is restricted (Reclamation and Ecology, 2011b). The two conservation projects proposed as part of YRBWEP Phase II are located in developed agricultural areas and would not affect recreation. The ongoing fish reintroduction program may provide improved potential for fish and wildlife viewing at the reservoir as aquatic and terrestrial productivity is increased.

4.14.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.14.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction to modify the radial gates would be limited to the area surrounding the dam spillway gates. Because public access near the dam is restricted, construction is not likely to disrupt recreation activities. Construction would not cause access restrictions to recreational facilities or dispersed recreation activities. Recreationists in the vicinity may hear construction noise, but expected noise increases would be minor in the vicinity of potential receptors.

Operation

Operation of the modified radial gates would not affect recreation because no recreational facilities or activities are located nearby.

Increased Reservoir Pool

Operation

Elevated water levels from the Cle Elum Pool Raise Project would last about 40 days a year, and would inundate some recreational facilities at Wish Poosh Boat Launch and Campground, Cle Elum River Campground, and Speelyi Beach Boat Launch and Day Use Area if not mitigated. The higher water levels would occur during the summer recreation season in years in which the increased storage is used. Higher reservoir levels would also flood dispersed camping, fishing, and boating access areas at the north end of the reservoir.

At Wish Poosh Boat Launch and Campground, the higher reservoir level would inundate access roads to a wellhouse and to the boat ramp, limiting access to the boat ramp during this period if not mitigated. In the Cle Elum River Campground, the additional inundated areas include a gravel access road, day use areas, five campsites, and two vault toilets. Higher reservoir levels would inundate some sections of Salmon La Sac Road, which provides access to recreational facilities along the east side of the reservoir (Section 4.17.4.3). The higher reservoir levels would also partially inundate the Speelyi Beach Boat Launch and Day Use Area.

Reclamation proposes to protect all of these areas from additional inundation. Section 2.4.5 describes the proposed shoreline protection projects for Wish Poosh and Cle Elum River campgrounds and for Salmon La Sac Road. These proposed shoreline protection projects would maintain access to and use of developed recreational facilities during periods of higher pool levels. Reclamation would address inundation of the Speelyi Beach Boat Launch and Day Use Area as part of increasing the freeboard of Saddle Dikes 2 and 3 (Section 2.4.4.2). Because Reclamation would provide shoreline protection for these recreation areas, inundation would be avoided and there are no anticipated permanent impacts on the developed recreation facilities in those areas.

Higher water levels would occur at informal boat launch areas located along the east bank of the Cle Elum River downstream from the NF-4308 bridge. About 400 feet of riverbank located at the river delta and the south end of the dispersed recreation area would be temporarily unavailable for up to 40 days for launching small boats during June and July when reservoir levels peak. However, 800 feet of additional riverbank along the east bank would remain available for launching small boats. The predicted higher inundation level would not flow over the banks in those areas, and higher water levels would not eliminate the ability to launch small boats.

No other change in fishing or boating opportunities on Cle Elum River or in the reservoir would occur during the higher inundation period. Small boats could still launch on the east bank of the river within Cle Elum River Campground and larger boats would still be able to use the concrete boat launch at Wish Poosh Boat Launch. Boats launched in either area could access the reservoir and river.

In years when the additional storage capacity is used, the increased inundation from the higher reservoir level would generally start in early June and extend to early July, lasting for approximately 40 days (Table 4-2). Areas that would be inundated include dispersed recreation areas at Dry Creek, Morgan Creek, and French Cabin Creek. Figure 2-4 shows the extent of inundation in these areas. Some portions of the dispersed recreation areas may remain accessible to recreation users, but most camping would be displaced during the period of the higher reservoir level. Dispersed camping would be available in other areas around the reservoir and would be available at Dry Creek, Morgan Creek, and French Cabin Creek later in the season when the reservoir level drops. Because the impacts to dispersed camping would be temporary, and other opportunities would be available throughout the camping season, impacts to dispersed camping would be negative, but not significant. If campers relocate to other areas that are not currently affected by dispersed camping, dispersed camping in these new areas could increase damage to natural resources. According to the

USFS, unregulated camping, day use, and motor vehicle use along the reservoir have contributed to localized water temperature increases, riparian soil and vegetation damage, littering, dumping, and physical damage to aquatic and shoreline channels, habitats, wetlands, and floodplain environments (Garvey-Darda, 2014).

4.14.4.2 Additional Storage Capacity for Instream Flow

Operation

The potential changes in instream flows in the Cle Elum River downstream from the reservoir and in the Yakima River downstream from the mouth of the Cle Elum River would not affect recreation because the changes would be small relative to existing river flows. Potential scenarios for filling the reservoir and releasing the water for instream flows would not create fluctuations in water levels that are substantially different than those that have been experienced historically (Section 4.2.4.2). Therefore, annual operation of Cle Elum Reservoir to improve instream flows would have no effect on recreation at the reservoir, in Cle Elum River downstream from the dam, or the Yakima River.

4.14.4.3 Rock Shoreline Protection

Construction

Construction of rock shoreline protection could temporarily disrupt the activities of anglers, hikers, and dispersed campers within sight and sound of the construction areas. Construction would impact nearby recreation uses by introducing noticeable noise and dust into the environment and temporarily restricting physical access to areas where construction activities are occurring. Construction would also temporarily impede access to the reservoir shoreline for some private landowners who are in immediate proximity to the construction activities. However, construction impacts would be temporary, typically lasting a few weeks in any one location. Construction would generally occur from August through October over approximately five construction seasons. Reclamation would not construct all shoreline protection measures simultaneously, reducing the level of construction and areas impacted at any given time. During construction, recreationists would be able to disperse to areas around the reservoir where disruption would be minimal. Overall, these disruptions would not be significant because the effects are temporary and other, similar recreation opportunities would be available in the same general area.

Operation

Rock shoreline protection measures would not have long-term impacts on recreation activities after construction. For some private properties where shoreline protection will be installed, the shoreline protection measures could make access to shorelines more difficult. If existing access is impeded, Reclamation would coordinate with these property owners and provide alternative access. It cannot be determined at this time if any permanent loss of existing private access to the reservoir shoreline would occur that could not be fully mitigated. If such losses occur, Reclamation will conduct the appropriate environmental review and compliance to identify and address the potential for significant adverse effects prior to installing shoreline protection on those properties.

4.14.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Construction of shoreline protection for Saddle Dike 1 and the right dam abutment would be limited to the areas near Cle Elum Dam. Because public access near the dam is restricted, construction is not likely to disrupt recreational activities in this area. Construction would not create access restrictions. Noise increases may disturb recreationists in the vicinity, but the construction duration would be less than 1 month so impacts are not considered to be significant.

Construction of shoreline protection for Saddle Dikes 2 and 3 would temporarily displace recreation uses at Speelyi Beach Boat Launch and Day Use Area, as well as dispersed recreation along Speelyi Beach. Construction activities would close the boat launch, day use area, and beach for approximately 2 months, starting after Labor Day. Because construction would start after Labor Day when recreation use decreases, impacts would not be significant.

Construction would also close portions of Lake Cabins Road for approximately 2 weeks. The closure would be confined to the area around the entrance to the Speelyi Beach Boat Launch and Day Use Area. Access would remain available for private properties along Lake Cabins Road. Alternative beach access could be provided by using an easement adjacent to Pineloch Sun Beach Club. This would increase vehicle and pedestrian traffic near this private facility, but because closure of part of Lake Cabins Road would occur after Labor Day and would last for approximately 2 weeks, impacts are not expected to be significant. Following construction, use of the easement adjacent to the beach club would be discontinued and impacts to the facility would stop.

Operation

Shoreline protection at Saddle Dike 1 and the right dam abutment would have no long-term impact on recreation. Shoreline protection at Saddle Dike 2 would replace the existing paved Speelyi Beach Boat Launch with a concrete boat ramp and provide new asphalt paving in the Speelyi Beach Day Use Area. The completed shoreline protection measures would protect recreation at these sites from the increased reservoir pool and no additional impacts to recreation would occur at the sites.

4.14.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction at Wish Poosh Campground and Boat Launch and Cle Elum River Campground would begin in September, after Labor Day, when the USFS closes the campgrounds for the season. Therefore, construction would not disrupt developed recreational use within these areas. However, construction of shoreline protection near these facilities as well as the Bell Boat Launch would impact nearby recreation uses such as boating, fishing, and camping by introducing noticeable noise and dust into the environment and restricting physical access to areas where construction activities are ongoing. Construction impacts would be temporary, typically lasting a few weeks in any one location. During construction, recreationists would be able to disperse to areas of the reservoir where disruption would be minimal. Overall, these disruptions would not be significant because the effects are temporary and other opportunities to engage in the affected activities are expected to remain available unimpaired in the same general area.

Construction along portions of Salmon La Sac Road at the north end of Cle Elum Reservoir would restrict travel to a single lane. The road would remain open during construction, but construction would cause minor traffic delays. One of the road segments passes near the WDFW Bell Boat Launch. Reclamation would coordinate with WDFW to maintain access to the boat launch during construction, so no impacts to use of the area are anticipated.

Construction of shoreline protection on the west shoreline would not impact developed recreational facilities because none are located near construction areas. Construction could disrupt dispersed or private recreation on the west side, but any impacts would be temporary and minimal, because no heavy equipment would be used during construction and noise and dust impacts would be minimal.

Operation

Once completed, shoreline protection measures at public recreational facilities would protect recreational uses and access. Reclamation would replace or improve recreational amenities removed during construction, such as interpretive signs, picnic tables, utilities, or toilets, as requested by the land manager. At Wish Poosh Boat Launch and Picnic Island, Reclamation would permanently disconnect water and electrical services. Reclamation would remove the existing toilets at Picnic Island and would coordinate with the USFS to install new portable or vault toilets, as appropriate, on the island and at the boat launch. Reclamation would replace campfire rings and picnic tables at the five campsites in the Cle Elum River Campground in coordination with the USFS. Shoreline protection on the west shoreline would have no impact on recreation because it would not be located near any developed recreational facilities and would not displace or decrease the quality of recreation at dispersed or private sites.

4.14.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction of aquatic habitat improvements at stream mouths on the west side of Cle Elum Reservoir would not impact developed recreational facilities because none are located near the stream mouths. Construction could disrupt dispersed or private recreation, but any impacts would be temporary and minimal because no heavy equipment would be used during construction and noise and dust impacts would be minimized.

Operation

Once completed, aquatic habitat improvements at stream mouths on the west side of Cle Elum Reservoir would have no impact on recreation because they are not located near any developed recreational facilities and would not displace or decrease the quality of recreation at dispersed or private sites.

4.14.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.14.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.14.4.1).

4.14.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.14.4.2).

4.14.5.3 Hybrid Shoreline Protection

Impacts of hybrid shoreline protection measures would be similar to the impacts of rock shoreline protection under Alternative 2 (Section 4.14.4.3).

4.14.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.14.4.4).

4.14.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.14.4.5).

4.14.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.14.4.6).

4.14.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.14.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.14.4.1).

4.14.6.2 Additional Storage Capacity for TWSA

Operation

Use of the additional storage capacity for TWSA would not affect recreation in the reservoir area. Potential scenarios for filling the reservoir and releasing the water for TWSA would not create fluctuations in water levels that are substantially different than those that have been experienced historically. Thus, annual operation of the Cle Elum Reservoir to improve TWSA would have no effect on recreation at the reservoir, on Cle Elum River downstream from the dam, or the Yakima River.

4.14.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.14.4.3).

4.14.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.14.4.4).

4.14.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.14.4.5).

4.14.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.14.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.14.4.1).

4.14.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.14.6.2).

4.14.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (4.14.5.3).

4.14.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.14.4.4).

4.14.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.14.4.5).

4.14.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.14.4.6).

4.14.8 Mitigation Measures

Reclamation would coordinate with the public land managers regarding the design and construction of all shoreline protection measures at public recreation facilities. Reclamation would start the construction work at Wish Poosh Campground and Boat Launch and Cle Elum River Campground after they are closed for the season in September. Construction work for Saddle Dikes 2 and 3, which would require closure of Speelyi Beach for approximately 2 months, would start after Labor Day when recreation use decreases. Most construction would not occur during peak recreation times to reduce the number of campers and other recreation users affected. If existing pedestrian access is affected at recreation facilities, Reclamation would replace any pedestrian access affected by the project in compliance with applicable standards of the Americans with Disabilities Act (ADA).

Reclamation would implement construction BMPs to minimize the impact on recreational facilities and their users from nuisance dust, noise, and conflicts with construction traffic during construction activities. Reclamation would conduct all work when the reservoir is drawn down to minimize the potential for sediment to enter the reservoir.

Reclamation would also take measures, in coordination with the USFS, to mitigate for impacts caused by existing dispersed camping, day use, and unauthorized motor vehicle access near the north end of the reservoir. The following measures would also reduce impacts to any new areas impacted by displacement of dispersed recreation:

- Install barrier guardrails along both sides of NF-4308 and north along portions the Cle Elum River in the French Cabin Creek dispersed recreation area to prevent vehicle access to the Cle Elum Reservoir and the river (Figure 4-11). The barriers would be approximately 150 feet above the ordinary high water mark of the river.
- Restore the French Cabin Creek dispersed recreation area and construct a 30-vehicle parking area west of the NF-4308 bridge to allow for walk-in camping and day use recreational activities.
- Install barriers to prohibit vehicles from parking in the forested area at the Morgan Creek and Dry Creek dispersed camping and boat launch areas and improve the road to accommodate boat launching.
- Install portable toilet facilities in heavily used dispersed recreation areas.
- Install signage in dispersed recreation areas, providing information about USFS dispersed camping regulations and how to reduce resource degradation.

The intent of these mitigation measures is to reduce the severity of resource degradation from dispersed recreation activities and enable environmental restoration and enhancement, while preserving or improving opportunities for compatible recreation activities. Protection of these areas is in compliance with the *Northwest Forest Plan* and *Wenatchee National Forest Plan* (USFS and BLM, 1994b; USFS, 1990). Specifically, protection and restoration of these areas complies with the Aquatic Conservation Strategy Objectives to protect the Riparian Reserves along the shoreline of Cle Elum Reservoir and the Cle Elum River. See Appendix E for a list of the Aquatic Conservation Strategy Objectives.

Potential adverse effects of installing the guardrails and implementing these restoration measures relate to noise and vibration during construction, visual quality, vegetation, wildlife, cultural resources, and recreation. Noise and vibration impacts during construction would be localized and of limited duration. Impacts on visual quality would be permanent, but are not expected to be significant. The new guardrails would be a change to the visual setting along the upper reservoir and Cle Elum River. The guardrails would comply with USFS standards and consist of wooden posts and metal rails that would rust to brown and blend with the forested area, reducing the visual impact.

Impacts to vegetation or wildlife would not be significant because minimal ground disturbance or vegetation removal would be required. Implementation of these mitigation measures would protect and restore vegetation and wildlife in the long term. Reclamation would conduct a cultural resources survey prior to construction activities to determine the presence of historic properties and would take appropriate mitigation measures for impacts on any cultural resources as described in Section 4.19.8.

Installation of guardrails along NF-4308 would eliminate vehicle access to the river and adjacent areas near the NF-4308 bridge, which is a popular take-out point for boaters. A parking lot would be provided west of the bridge which could be used by boaters. Boaters may also choose to park along NF-4330 (Salmon La Sac Road) and carry their boats to the river. Reclamation would coordinate with the USFS to insure that the guardrails cause no safety hazards for pedestrians along NF-4308. Walk-in recreation uses in these dispersed camping areas would be temporarily disrupted during the guardrail installation.

Installation of the guardrails would permanently block vehicle-oriented dispersed recreation at the Dry Creek and French Cabin Creek areas. Recreationists would still be able to walk into these areas and walk-in camping would be allowed. Restricting vehicle use would be a negative impact to some forms of dispersed recreation, but vehicle-oriented dispersed recreation would still be allowed in areas where such uses would not negatively impact riparian areas. Reclamation and the USFS are implementing the mitigation measures to offset the impacts to vegetation, wildlife and other natural resources.

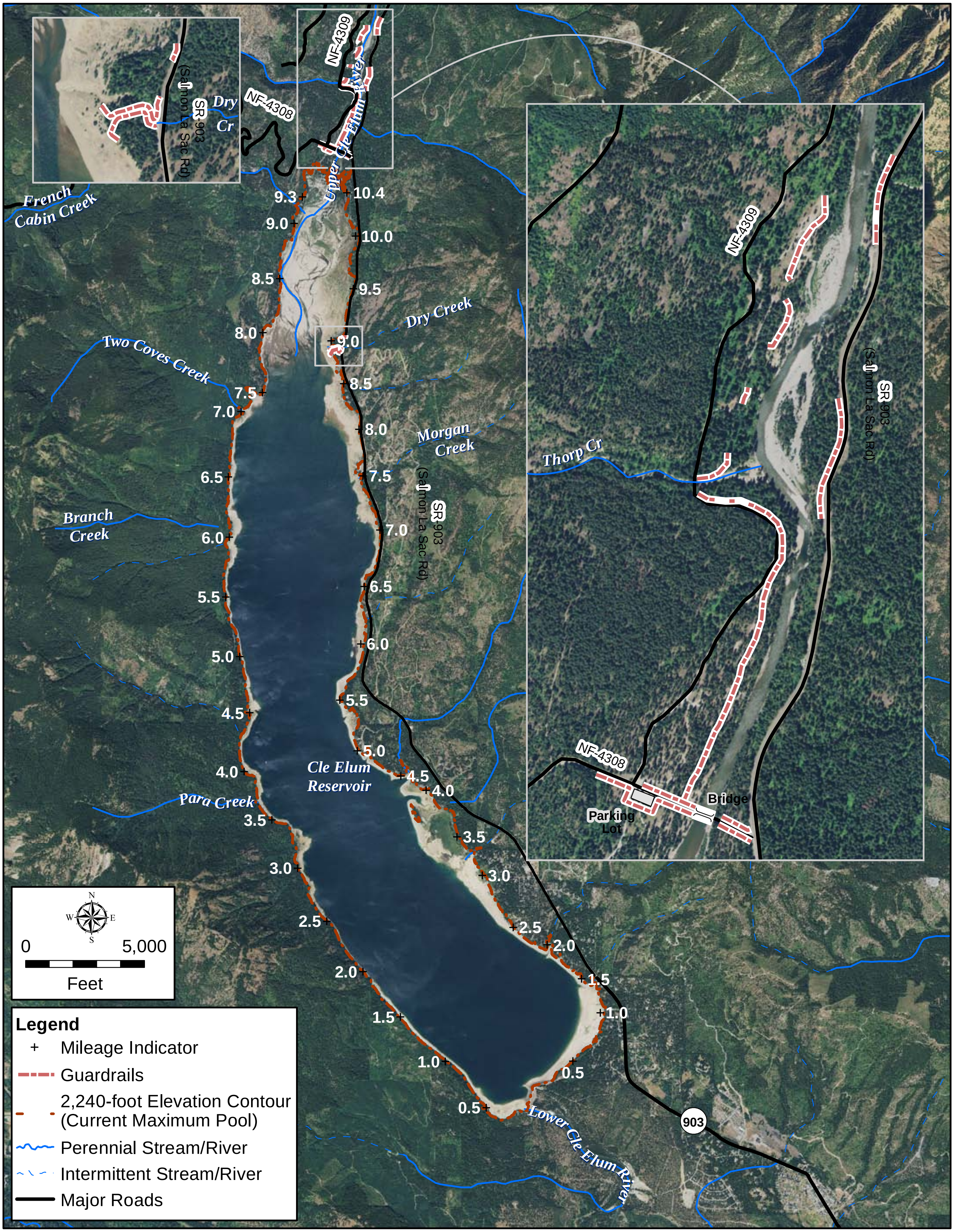

Figure 4-11. Proposed Guardrail Locations along the Cle Elum River

4.15 Land and Shoreline Use

4.15.1 Methods and Impact Indicators

For this analysis, Reclamation examined changes in land use, including conversion of land use from residential or shore-based recreational uses of the reservoir, and acquisition of private property and easements. Reclamation reviewed the Proposed Action for compatibility with applicable Federal, State, and local land use plans and regulations. The area for impact analysis for land and shoreline use is the land directly adjacent to Cle Elum Reservoir, particularly public and private land that the Cle Elum Pool Raise Project would inundate, the sites of shoreline protection measures, and the sites of construction activities. Table 4-29 lists impact indicators and significance criteria for land use.

Table 4-29. Land and Shoreline Use Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Conversion of land from existing use	A change in how private property owners can utilize a substantial portion of their property, or a conversion in use of the entire parcel
Acquisitions of private property or easements	Any involuntary change in land ownership, such as involuntary Federal acquisition of land rights or not following Federal property acquisition policies
Compatibility with applicable Federal, State, and local land use plans and regulations	Any substantive conflict with local land or shoreline use designations or relevant goals, objectives, and policies or applicable State or Federal management plans and programs

4.15.2 Summary of Impacts

The No Action Alternative would not impact land use because no activities would occur at the reservoir to change land use or conflict with applicable plans and regulations. The two conservation projects proposed as part of YRBWEP Phase II are located in developed agricultural areas and would not change the use of the properties.

Alternatives 2 through 5 would inundate some areas of USFS-managed land and some private property. The increased inundation would not change how Federal agencies or private property owners can use the land because the project would inundate a small portion of land for a short duration of about 40 days a year and because Reclamation is providing shoreline protection for those properties. Reclamation would acquire some real property or easements to construct and maintain the shoreline protection measures. The acquired areas would be in narrow strips along the shoreline, would not change or disrupt the current use of the properties impacted, and would not be involuntary. Federal property acquisition policies would be followed. Additional inundation of the upper Cle Elum River where it enters the reservoir could affect designation of this portion of the river as a Wild and Scenic River as proposed in the Wenatchee National Forest Plan. Alternatives 2 through 5 would not conflict with other existing land use plans and regulations.

4.15.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, existing land use patterns and development trends would continue. The No Action Alternative could result in long-term land use changes as a result of reduced water reliability, as discussed in Section 5.16.1 of the Integrated Plan PEIS (Reclamation and Ecology, 2012). Reconstruction of the interim fish passage facilities would take place on Reclamation managed property and would not change the use of the property. All land required for construction of the permanent fish passage facilities would be Federal land that is managed by either Reclamation or the USFS. The area that would be converted to fish passage facilities is small (less than 3 acres) and the uses are compatible with the other uses of the dam (Reclamation and Ecology, 2011b). The two conservation projects proposed as part of YRBWEP Phase II are located in developed agricultural areas and would not change the use of the properties.

4.15.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

A number of Federal, State, and local plans and policies guide management of Cle Elum Reservoir and the surrounding lands. Because Cle Elum Reservoir is located within the Okanogan-Wenatchee National Forest, Reclamation and the USFS share jurisdiction for much of the affected Federal lands and resources. Reclamation is exercising its primary authority as delegated by Congress to implement the Cle Elum Pool Raise Project. Therefore, Reclamation would adhere to the laws and regulations that govern its own actions in implementing the proposal and the project would be compatible with Federal plans and regulations.

The project would not impact the Alpine Lakes Wilderness Area, which includes the headwaters of the Cle Elum River, because it is outside the project area. No Wild and Scenic Rivers are located near the Cle Elum Reservoir. The Integrated Plan recommends that the USFS consider Wild and Scenic River designation for the upper Cle Elum, Waptus, and Cooper rivers. Inundation from the Cle Elum Pool Raise Project would not affect the Waptus or Cooper rivers. Section 4.15.4.1 discusses potential impacts on designations of the upper Cle Elum River.

4.15.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction to modify the radial gates would be limited to the area around the dam spillway gates, which is Federal property managed by Reclamation. There would be no change to or acquisition of private property. Construction and operation of the modified radial gates would not cause changes to land use or be incompatible with existing land use plans or policies. Construction impacts would be minor and would not cause detours or other impacts that could affect use of adjacent properties.

Operation

Operation of the modified radial gates would not cause any change in land use and would be compatible with existing plans and policies.

Increased Reservoir Pool

Operation

The Cle Elum Pool Raise Project would inundate additional lands around the reservoir as shown in Figures 2-3 to 2-7. The additional area inundated by the higher reservoir levels includes federally owned facilities, such as the existing dam embankment, developed USFS campground areas, and undeveloped Federal property around the perimeter of the reservoir. Some privately owned residential properties would also experience increased inundation. The estimated additional inundated area is approximately 46 acres of Federal land and less than 3 acres of privately owned property. Table 4-30 provides a description of these areas. Information on inundation of lands in the Wish Poosh and Cle Elum River campgrounds and other recreational facilities is included in Section 4.14, Recreation. The increased inundation would not change the ability of the Federal agencies or private property owners to use the land because the project would inundate a small portion of land for a short duration of about 40 days a year, and only in the years with sufficient runoff. Therefore, there would not be a change in how private property owners can utilize a substantial portion of their property.

Additional inundation of the upper Cle Elum River where it enters the reservoir could affect designation of this portion of the river as a Wild and Scenic River. As discussed in Section 3.15.1.6, the *Wenatchee National Forest Plan* recommends designation of the Cle Elum River between Lake Tucquala and Cle Elum Reservoir as Recreational (USFS, 1990). As discussed in Section 4.14, inundation would not limit the use of Cle Elum River for recreation, and would not impact the NF-4308 bridge. The project might inundate a short portion of the river as it enters the reservoir for approximately 40 days in some years. Additional inundation could cause a short portion of the river to be ineligible for Wild and Scenic River designation. Because the majority of the river would still be eligible and the action would not limit use of the river for recreation, the conflict with the recommendation in the *Wenatchee National Forest Plan* is not substantial and therefore the impact would not be significant.

The higher pool level would not inundate any residential structures. The project would inundate primarily beach and embankment areas. Reclamation has not yet confirmed ownership of the property the project would inundate and is currently working to survey property boundaries to confirm the ownership. Reclamation would address impacts on private property as part of the project design for construction of shoreline protection measures.

Table 4-30. Location of Additional Inundated Areas

Description of Area	Figure Number	Additional Private Area Inundated (acres)	Additional Public Area Inundated (acres)
Northern portion, including Cle Elum River Campground and informal campgrounds on the east and west sides of Cle Elum River	2-3	--	17.25
Northern portion, including small portion of Cle Elum River Campground	2-3	--	3.28
East bank, including small portion of Cle Elum River Campground	2-3	--	0.34
West bank	2-3, 2-4	--	0.11
Northern portion, including some private property on eastern bank	2-3, 2-4	0.39	2.81
East bank, including some private property	2-3, 2-4	0.13	0.66
West bank	2-4	--	1.11
Small portion of west bank	2-4	--	0.40
East bank	2-4	<0.01	1.54
Small portion of west bank	2-4	--	0.12
Small portions of west and east banks	2-4	--	1.27
East bank, including private properties	2-4	0.74	0.66
West bank	2-4, 2-5	--	1.58
East bank, including private properties, boat ramp, and Wish Poosh Campground	2-4, 2-5, 2-6	0.16	4.87
Small portion of east bank, including private properties	2-6	0.04	--
West bank	2-5	<0.01	0.87
South portion, including private properties on west bank	2-5, 2-6	0.14	0.39
East bank, including private properties and White Fir Drive Boat Ramp	2-6	0.55	2.68
Southwest portion, including private properties	2-5, 2-6	0.16	0.38
Southern portion, including private properties on west bank and dam area	2-7	0.18	0.19
Southeast portion, including private properties and Speelyi Beach Day Use Area	2-7	0.07	1.85
Southern portion, including Cle Elum Dam and spillway	2-7	--	0.92
Total additional inundation area		2.6	43.3

4.15.4.2 Additional Storage Capacity for Instream Flow

Operation

Use of the additional storage capacity for instream flows would not have an impact on land use because the additional instream flows would not cause changes to land use or be incompatible with applicable plans or regulations.

4.15.4.3 Rock Shoreline Protection

Construction

Construction of rock shoreline protection could temporarily disrupt use of private residential properties for the duration of construction by causing noise and blocking access to the shoreline. Access to some sites could require construction of new access roads, but the project would not disrupt access from existing roads. Construction would be temporary and would not change how private property owners can utilize their property, so the impact would not be significant.

Operation

Rock shoreline measures would require acquisition of private land or easements on narrow strips of land approximately 20 feet to 50 feet wide along the shoreline where Reclamation would install protection measures. Because the acquisition would be on a narrow strip of land adjacent to the shoreline and the project would not disturb the remaining property, rock shoreline protection would not change how private property owners can utilize a substantial portion of their property and would not lead to a conversion in use of the entire parcel. Property acquisition for rock shoreline protection measures is analyzed below in Section 4.15.4.7.

The requirements of the Kittitas County Shoreline Master Plan (SMP) and Critical Areas Ordinance (CAO) would apply to shoreline protection on private land. Reclamation would apply for the appropriate permits and coordinate with Kittitas County to ensure that shoreline protection measures meet the guidelines and requirements of the SMP and the CAO. Therefore, rock shoreline protection measures would not conflict with local plans or regulations.

4.15.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Construction to raise Saddle Dikes 2 and 3 would close portions of Lake Cabins Road for approximately 2 weeks. This road closure would not restrict landowner access, as there are alternate routes to properties to the north and south of the closure. Construction at Saddle Dike 1 and the right dam abutment would not impact land use because it would occur on Federal land managed by Reclamation and would not change Reclamation’s use of land in the area.

Operation

The increased freeboard at the three saddle dikes and the right dam abutment would not change how these areas are used and would not have long-term impacts on land use.

4.15.4.5 Shoreline Protection for Public Lands and Facilities

Shoreline protection measures on the west shoreline of Cle Elum Reservoir and at public recreation facilities would be located on public lands. Therefore, the measures would not change how private property owners can use their property and would not require property acquisitions or easements. Construction of shoreline protection would disrupt use of recreation facilities as described in Recreation (Section 4.14.4.5), but temporary disruption during construction would not change the land use of the facilities. Shoreline protection actions on public lands would be compatible with existing land use plans and regulations.

4.15.4.6 Improve Aquatic Habitat at Stream Mouths

The improvement of habitat at stream mouths would take place on Federal land on the west side of Cle Elum Reservoir, so there would be no impact to or conversion of private property. Aquatic habitat improvement would be compatible with applicable land use plans and regulations.

4.15.4.7 Land Acquisition for Shoreline Protection

Construction of shoreline protection would require acquisition of private land or easements on narrow strips of land approximately 20 feet to 50 feet wide along the shoreline where Reclamation would install protection measures. Reclamation would survey properties before construction to determine whether acquisition is required, and would work with property owners on a site-by-site basis to determine the best approach for each site. The expected acquisitions and installation of shoreline protection would not render the private properties unsuitable for their existing uses because the acquisition would be on a narrow strip of land adjacent to the shoreline and the project would not disturb the remaining property. Therefore, land acquisition would not change how private property owners can utilize a substantial portion of their property and would not lead to a conversion in use of the entire parcel.

The extent of land Reclamation would acquire would depend on the specific site and the design of shoreline protection for that site. Reclamation would need to acquire land to excavate the shoreline and to install the protection measures. Reclamation anticipates that the acquisitions would consist of strips of land extending 25 to 50 feet shoreward of the ordinary high water mark. Reclamation may also need to acquire land or easements to allow access for construction and to maintain the shoreline protection. Reclamation estimates that the total area of property acquisition for this alternative would be approximately 20 acres.

Reclamation would acquire property only from willing sellers. Reclamation would work with property owners to determine what shoreline protection measures are appropriate and the extent of acquisition required. Reclamation would follow the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

(42 USC 4601) and the procedures described in the Reclamation Manual Directives and Standards (LND 06-01, 2003) for any property or easement acquisition. Impacts from land acquisition would not be significant because there would be no involuntary change in land ownership and all Federal property acquisition policies would be followed.

Prior to acquiring any real property, easements, and acquisitions, Reclamation would hire certified contractors to conduct all Appropriate Inquiries surveys related to environmental site assessments. These assessments evaluate a property's environmental conditions and identify the likelihood of any contamination. Components of the surveys include interviews with past and present landowners or occupants; searches for recorded environmental cleanup liens; reviews of Federal, Tribal, State and local governments records; and visual inspections of the real property and adjoining properties. Reclamation would take any necessary remediation associated with the site into consideration as part of securing the land interest.

4.15.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

Alternative 3 would have the same impacts on Federal plans and policies as Alternative 2 (Section 4.15.4).

4.15.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.15.4.1).

4.15.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.15.4.2).

4.15.5.3 Hybrid Shoreline Protection

Hybrid shoreline protection measures would have the same land use impacts as rock shoreline protection measures, described for Alternative 2 (Section 4.15.4.3).

4.15.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.15.4.4).

4.15.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.15.4.5).

4.15.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.15.4.6).

4.15.5.7 Land Acquisition for Shoreline Protection

Impacts of land acquisition for hybrid shoreline protection would be similar to those for rock shoreline protection. Reclamation would follow the same procedures for land acquisition for hybrid shoreline protection as for rock shoreline protection (Section 4.15.4.3).

4.15.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

Alternative 4 would have the same impacts on Federal plans and policies as Alternative 2 (Section 4.15.4).

4.15.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.15.4.1).

4.15.6.2 Additional Storage Capacity for TWSA

Operation

Impacts would be the same as for Alternative 2 (Section 4.15.4.2).

4.15.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.15.4.3).

4.15.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.15.4.4).

4.15.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.15.4.5).

4.15.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.15.4.6).

4.15.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

Alternative 5 would have the same impacts on Federal plans and policies as Alternative 2 (Section 4.15.4).

4.15.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.15.4.1).

4.15.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.15.6.2).

4.15.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.15.5.3).

4.15.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.15.4.4).

4.15.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.15.4.5).

4.15.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.15.4.6).

4.15.8 Mitigation Measures

Reclamation would work with shoreline property owners to determine the appropriate type of shoreline protection for their properties and to reduce the amount of property acquisition or easements needed. For any property or easement acquisition, Reclamation would comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, (42 USC 4601) and the procedures described in the Reclamation Manual Directives and Standards (LND 06-01, 2003).

4.16 Utilities

4.16.1 Methods and Impact Indicators

The analysis of potential effects on utilities relies on identifying the existing utilities in the project area, including electricity, telecommunications, sewer, water, and solid waste; comparing them to the utility requirements of the proposed facilities; and making a determination as to the sufficiency of the existing utilities to meet the needs of the project. The analysis also considers interruption of existing utilities and whether the Proposed Action would require relocation of any utilities. The area of impact analysis for utilities is the area around the reservoir served by electric or solid waste utilities.

Potential impacts on OSS and groundwater wells are described in Section 4.5.4.1. Table 4-31 lists impact indicators and significance criteria for utilities.

Table 4-31. Utilities Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Sufficiency of existing utilities for the project	Substantial changes in the demand for utilities leading to exceedance of the locally available supply
Interruption of existing utilities	Likely or anticipated interruption of any utility service during construction for more than an 8-hour duration

4.16.2 Summary of Impacts

Reconstruction of the interim fish passage facilities would not require additional utilities during construction or operation. Construction of the permanent fish passage facilities would not generate solid waste, and would not disrupt or require relocation of any existing utilities. The permanent fish passage facilities would require a minor, insignificant increase in electricity use. No additional construction or changes at Cle Elum Reservoir are anticipated that would change the demand for or interrupt utility service. The two conservation projects would not require additional utility service.

None of the project components under Alternatives 2 through 5 would require access to existing utilities or generate solid waste; therefore, there is no potential for the projects to exceed the existing capacity of those utilities. Under all action alternatives, Reclamation would remove vault toilets at Speelyi Beach and Wish Poosh and Cle Elum River campgrounds and replace them with either new vault toilets or portable toilets in a new location. Reclamation would also permanently remove the water and electrical services to Picnic Island and the boat launch area at Wish Poosh Campground. Reclamation would coordinate with the USFS on utility work at these locations to minimize any potential impacts to service. No other utility interruptions are anticipated during construction.

4.16.3 Alternative 1 – No Action Alternative

The projects identified as occurring under the No Action Alternative, as described in Section 2.3, would not impact utilities because they would not require new utility connections and would not interrupt any existing utilities. Under the No Action Alternative, Reclamation would reconstruct the existing interim and construct two conservation projects proposed under YRBWEP Phase II and the new permanent fish passage facilities. Construction of the fish passage facilities under the No Action Alternative would not require access to existing utilities, would not generate solid waste, and would not disrupt or require relocation of any existing utilities. Electricity would need to be extended to the left side of the dam for the permanent fish passage facilities, but the minor increased demand for power would not exceed the locally available supply (Reclamation and Ecology, 2011b). No additional construction or changes at Cle Elum Reservoir are anticipated that would change the demand for or interrupt utility service. The two conservation projects would not require additional utility service.

4.16.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.16.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Construction activities associated with the radial gate modifications would not require access to existing utilities, would not generate solid waste, and would not disrupt or require relocation of any existing utilities. Therefore, no impacts on utilities are anticipated.

Operation

Operation of the modified radial gates following construction would not increase the power required to operate the gates, would not generate solid waste, and would not require access to additional utilities. Therefore, no impacts on utilities are anticipated.

Increased Reservoir Pool

Operation

Reclamation does not anticipate that increased water levels would affect utilities because the only utilities located in the newly inundated areas are those at Wish Poosh Campground. Section 4.16.8 describes measures to reduce impacts on those utilities.

4.16.4.2 Additional Storage Capacity for Instream Flow

The use of water for instream flows would not affect utilities because it would not conflict with existing utilities, would not generate solid waste, and would not require access to additional utilities; therefore, Reclamation anticipates no utility impacts from the use of additional storage capacity for instream flow.

4.16.4.3 Rock Shoreline Protection

Construction

Construction activities associated with installation of rock shoreline protection would not require access to existing utilities, and would not disrupt or require relocation of any existing utilities. Shoreline protection measures would be located in a narrow strip (25 to 50 feet wide) on the reservoir shoreline and it is unlikely that they would impact any utilities. It is possible that private utility lines could be located in the shoreline areas proposed for protection. Reclamation would identify these locations during final design and take appropriate measures to minimize the effects of any conflicts.

Operation

The completed project would not conflict with existing utilities, would not generate solid waste, and would not require access to additional utilities; therefore, Reclamation anticipates no utility impacts from rock shoreline protection.

4.16.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Construction activities associated with the saddle dikes and right dam abutment would not require access to existing utilities, and would not disrupt or require relocation of existing utilities. It is unlikely that utility lines are located in the construction areas, but Reclamation would confirm the location of utilities during final design and take appropriate measures to minimize disruption of any utilities identified. Reclamation would remove the existing vault toilets at Speelyi Beach Day Use Area and replace them with either new vault toilets or portable toilets.

Operation

The completed project would not conflict with existing utilities, would not generate solid waste, and would not require access to additional utilities; therefore, no impacts on utilities are anticipated.

4.16.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction activities associated with shoreline protection would not require access to existing utilities and would not generate solid waste; therefore, no impacts on regional utilities are anticipated. Construction would require removal of the vault toilet at the Picnic Island day use area within Wish Poosh Campground. It would be replaced with either new vault toilets or portable toilets in a new location. Reclamation would remove the water and electrical services to Picnic Island and the boat launch area. Reclamation would remove the flush toilet at the Wish Poosh boat ramp and replace it with either a new vault toilet or a portable toilet. Reclamation would also relocate the two vault toilets at the Cle Elum River Campground to locations further from the higher reservoir level. Reclamation would replace them with either new vault toilets or portable toilets in a new location. Reclamation would coordinate all utility service removals with the USFS to minimize any potential impacts to service.

Operation

The completed project would not require access to additional utilities, would not disrupt existing utilities, and would not generate solid waste. Reclamation would replace or relocate the vault toilets at Wish Poosh and Cle Elum River campgrounds, and no long-term impacts to campground utilities would result from project operation.

4.16.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Construction activities associated with improving aquatic habitat would not require access to existing utilities and would not generate solid waste; therefore, no impacts on utilities are anticipated.

Operation

The completed project would not require access to additional utilities, would not disrupt existing utilities, and would not generate solid waste; therefore, no impacts on utilities are anticipated.

4.16.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.16.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.16.4.1).

4.16.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.16.4.2).

4.16.5.3 Hybrid Shoreline Protection

Construction activities associated with the hybrid shoreline protection would be similar to those for rock shoreline protection (Section 4.16.4.3).

4.16.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.16.4.4).

4.16.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.16.4.5).

4.16.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.16.4.6).

4.16.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.16.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.16.4.1).

4.16.6.2 Additional Storage Capacity for TWSA

Use of additional stored water for TWSA would not impact utilities.

4.16.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.16.4.3).

4.16.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.16.4.4).

4.16.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.16.4.5).

4.16.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.16.4.6).

4.16.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.16.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.16.4.1).

4.16.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.16.6.2).

4.16.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.16.5.3).

4.16.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.16.4.4).

4.16.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.16.4.5).

4.16.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.16.4.6).

4.16.8 Mitigation Measures

Reclamation would conduct utility surveys during final design and take appropriate measures to minimize conflicts with any utilities identified in the construction areas. Any potential conflicts or relocation would be coordinated with the affected utility and land owner. Reclamation also would coordinate with the USFS to relocate or replace affected utilities, as appropriate.

4.17 Transportation

4.17.1 Methods and Impact Indicators

The transportation analysis includes evaluating changes to the following aspects of transportation systems:

- Vehicle traffic levels and potential traffic flow disruptions
- Inundation of roads and bridges
- Interruptions to emergency service vehicle response caused by an increase in traffic or road closures
- Disruptions to the use or accessibility of other means of transportation (e.g., snowmobiles, pedestrian, bicycles) through closure of trails, sidewalks, or bicycle paths
- Reduction in available parking
- Potential for increased vehicle conflicts and safety concerns

The area of impact analysis includes the roads used to access the dam and reservoir area and roads near the reservoir used to access residential and recreational sites along the reservoir and upper Cle Elum River.

The impact indicators for transportation relate to whether construction activities would cause temporary increases in construction traffic; delays of vehicles and emergency service providers caused by detours or short-term traffic disruptions; and increased safety concerns on primitive, rural, or residential roadways for local travel. Impact indicators also include deterioration of local roadways and increased maintenance requirements caused by additional traffic or the presence of oversized vehicles on local roadways. Impact indicators and significance criteria for transportation are shown in Table 4-32.

Table 4-32. Transportation Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Increase in vehicle traffic levels or traffic flow disruptions	Increase of 25 or more peak-period (a.m., p.m., or both) construction roundtrips (50 one-way trips)[1] Interruption of emergency service vehicle access or more than a minor increase in emergency service response time More than a moderate interruption to or potential conflict with other means of transportation (e.g., snowmobiles, pedestrians, bicycles) More than a minor increase in safety risk to motorists or other users of local roads
Inundation of roads and bridges	Road or bridge closures as the result of inundation
Reduction in existing parking	More than a 10 percent reduction in available parking spaces
Condition of roadways and maintenance requirements	More than moderate deterioration of local roadways

[1]This screening criterion relates to that recommended by the Institute of Transportation Engineers for assessing the effects of construction projects that create temporary traffic increases (ITE, 1989)

4.17.2 Summary of Impacts

The No Action Alternative, which includes the interim and permanent fish passage facilities, fish reintroduction project, and YRBWEP Phase II conservation projects, would not result in impacts on transportation because the projects would not result in a notable increase in traffic levels in the project area.

Impacts to transportation from Alternatives 2 through 5 would be similar to one another. The increase in construction vehicle traffic would represent a temporary, negligible change over existing traffic levels, and traffic levels would return to normal following construction. There are no weight or height limitations that are likely to restrict access of construction equipment to the site, and no oversized vehicles would be required during construction. None of the alternatives would result in inundation of roads or bridges at the reservoir site or downstream. Construction would not delay emergency vehicle response or disrupt the use or accessibility of people using other means of transportation (e.g., bicyclists, snowmobilers, pedestrians). All action alternatives would require temporary closure of a portion of Lake Cabins Road for less than 2 weeks during construction at Saddle Dikes 2 and 3. Alternative routes to the properties north and south of the closure are available, so the closure would not restrict landowner access. Construction to increase shoreline protection on portions of Salmon La Sac Road would temporarily restrict traffic to one lane, but Reclamation would maintain access. Once construction is complete, the project would not require additional trips for maintenance or operation.

4.17.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, the construction of the interim and permanent fish passage facilities would require delivery of construction materials and workers to commute to the construction site. These activities would not be expected to cause major increases in traffic in the project area. Operation of the fish passage facility would not generate new traffic as the only vehicle trips would be for occasional maintenance activities (Reclamation and Ecology, 2011b).

The fish reintroduction project would generate approximately 10 trips per year from hatchery facilities outside of the Yakima Basin, ranging from approximately 200 to 500 miles round trip. Transportation of adult fish from the fish trap facility at the base of Cle Elum Dam would require one or two trips per day. An additional one trip per day for a 6 month period each year would be required for feeding smolts. These vehicle trips would not result in a notable increase in traffic in the project area (Reclamation and Ecology, 2011b).

The YRBWEP Phase II conservation projects would cause temporary increases in traffic during construction, but would not result in new traffic sources during implementation or operations. Overall, the No Action Alternative projects would not cause impacts on transportation.

4.17.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.17.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction

Modification of the existing radial gates on the Cle Elum Dam spillway would require minimal truck shipments of construction materials would be minimal because the project requires no cut and fill. Four or less employees are expected to commute to the job site, resulting in four peak period vehicle trips during the 6- to 9-month construction period. Local access to the work site would be on existing local roadways, including SR-903 (Salmon La Sac Road), Lake Cabins Road, and County Road 25010 (Lake Cle Elum Dam Road). The additional four peak period vehicle trips would be minor and would not cause noticeable increases in vehicle traffic levels.

Construction would not require oversized vehicles and no weight or height limitations are likely to restrict access of construction equipment to the site. Therefore, no upgrades to existing roadways would be required to facilitate construction vehicle access. Reclamation expects that the overall increase in vehicle traffic would result in negligible deterioration of local roads; however, Reclamation would require contractors to repair any damage and restore roadways to a condition similar to or better than that prior to construction.

Changes to existing access for pedestrians, snowmobiles, and bicycles along local roadways are not anticipated because no sidewalks, snowmobile routes, or bicycle routes would be impacted by construction activities. Construction parking would be located at project staging areas; therefore, construction is not anticipated to affect existing parking areas or demand. No roads or bridges would be inundated by construction activities. The increase in traffic delays would not impact the ability of emergency personnel to respond to an incident because there would be only short-term, intermittent delays for construction activities, and no road closures are planned.

The increase in vehicle traffic during construction would contribute to a minor increased safety risk to motorists or other users of local roads and increase the accident risk. A traffic management plan would be developed prior to construction to minimize potential safety risks.

Operation

There are no anticipated transportation impacts during operation and maintenance because the project would result in no additional traffic on local or regional roadways.

Increased Reservoir Pool

Operation

The increased reservoir pool would not inundate roads in the project area; therefore, no impacts on transportation would occur. The higher pool level would not affect SR-903 (Salmon La Sac Road) and the NF-4308 bridge over the Cle Elum River. As discussed in Section 4.17.4.3, Reclamation would install additional shoreline protection along stretches of Salmon La Sac Road to prevent erosion.

4.17.4.2 Additional Storage Capacity for Instream Flow

Release of additional storage capacity for instream flow would not result in any changes to transportation in the project area. Increased flows in the river would be small relative to existing river flows and would not impact downstream transportation infrastructure.

4.17.4.3 Rock Shoreline Protection

Construction

Construction of rock shoreline protection would require truck shipments of construction materials and transportation of workers to work sites. Construction at the Speelyi Beach Day Use Area and WSDOT pullout would use local materials, eliminating the need for hauling to the site. For construction at the other locations described in Section 2.4.3.1, Reclamation would import an estimated 45,000 cy of rock riprap for construction at each location. Reclamation proposes to acquire the rock material from a commercial quarry approximately 15 to 30 miles from the reservoir. Delivery of the materials would require approximately 5,000 truck trips, each hauling 20 tons of rock. Over the course of the construction period (generally August through October), this activity would equate to approximately 59 trucks per day (or up to 6 trips per hour) travelling along SR-903 or Lake Cle Elum Dam Road to and from I-90. Approximately 44 employees are expected to commute to the job site. Because most workers would arrive in the morning and depart in the evening, 44 vehicles per hour were assumed to arrive between the hours of 7 and 9 a.m. and depart between the hours of 4 and 6 p.m.

Together, construction worker trips and delivery of materials would result in an estimated 50 roundtrips during peak hours. During the nonpeak hours of the day, traffic would be lower because there would be less construction worker traffic. This would represent a significant impact because the increase in vehicle traffic would exceed the threshold of 25 peak period roundtrips and the increased peak period traffic could cause increased traffic delays on local roadways. However, Reclamation expects construction to occur in phases over a period of 5 years as funding becomes available, reducing the expected truck trips during any one construction year and making the impacts less than significant.

Construction would not require oversized vehicles and no weight or height limitations are likely to restrict access of construction equipment to the site. Therefore, no upgrades to existing roadways would be required to facilitate construction vehicle access. Reclamation expects that the overall increase in vehicle traffic would cause minor to moderate deterioration of local roads and Reclamation would require contractors to repair any damage and restore roadways to a condition similar to or better than that prior to construction. The increased traffic delays would not impact the ability of emergency personnel to respond to an incident because there would be only short-term, intermittent delays for construction activities, and no road closures are planned.

Changes to existing access for pedestrians, snowmobiles, and bicycles along local roadways are not anticipated because no sidewalks, snowmobile routes, or bicycle routes would be impacted by construction activities. Construction parking would be located at project staging areas; therefore, construction is not anticipated to affect existing parking areas or demand. No roads or bridges would be inundated by construction activities.

The increase in vehicle traffic during construction would contribute to a minor increased safety risk to motorists or other users of local roads. The presence of additional construction traffic on local roadways could increase the accident risk. A traffic management plan would be developed prior to construction to minimize the potential safety risks.

Operation

The completed project would result in little or no additional traffic on local or regional roadways, so there would be no transportation impacts during operations.

4.17.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Construction

Raising the elevation of the saddle dikes would require truck shipments of construction materials and transportation of workers to job sites. Reclamation would access Saddle Dike 1 from the paved Lake Cle Elum Dam Road and north 800 feet along the gravel-surfaced main dike to a cleared area. From the cleared area, Reclamation would construct an access road roughly 330 feet long and 20 feet wide. Salvaged as well as imported riprap would be required. Trucks would haul the imported riprap via public roads, requiring less than 20 truckloads. Reclamation expects construction to take approximately 2 weeks with approximately two trucks per day travelling along Lake Cle Elum Dam Road. This would represent a temporary, negligible increase over existing traffic levels, which would return to normal following construction.

Access to Saddle Dikes 2 and 3 would be via Lake Cabins Road. Construction would require closure of a portion of Lake Cabins Road from 100 feet south of Saddle Dike 2 to 100 feet north of Saddle Dike 3 for approximately 2 weeks. The closure would not restrict access for landowners who would still be able to use most of Lake Cabins Road. An alternate route to Speelyi Beach would be available as described in Section 4.14.4.4. Repaving the asphalt parking lot and removing miscellaneous improvements (ecology block retaining walls) at the day use area would require 15 dump truck loads. To raise Saddle Dike 2, approximately 78 truck trips would be required to transport material to the site, a short distance along Lake Cabins Road. To raise Saddle Dike 3, approximately 43 truck trips would be required to transport material from the borrow area, a short distance along Lake Cabins Road. This activity would represent a temporary, negligible increase over existing traffic levels, which would return to normal following construction.

To construct the new boat ramp, cement mixers would transport concrete to the site; approximately 10 trips would be required along Lake Cabins Road. Hauling riprap to the site would require approximately 110 truck trips over a 2-month period. Approximately 100 truck trips would be required to transport material to construct the armored berm on the right abutment of the dam with an additional 50 loads required to haul gravel. All materials would be transported from the borrow area via Lake Cabins Road. This activity would represent a temporary, negligible increase over existing traffic levels, which would return to normal following construction.

The expected increased truck shipments and transportation of workers to job sites would not disrupt traffic in the area or exceed road capacity because the increase would represent a temporary, negligible change over existing traffic, which would return to normal following construction.

Construction would not require oversized vehicles and no weight or height limitations are likely to restrict access of construction equipment to the site. Therefore, no upgrades to existing roadways would be required to facilitate construction vehicle access. Reclamation expects that the overall increase in vehicle traffic would result in minor to moderate deterioration of local roads and would require contractors to repair any damage and restore roadways to a condition similar to or better than that prior to construction. The increase in traffic delays would not impact the ability of emergency personnel to respond to an incident because there would be only short-term, intermittent delays for construction activities, and no road closures are planned.

Changes to existing access for pedestrians, snowmobiles, and bicycles along local roadways are not anticipated because no sidewalks, snowmobile routes, or bicycle routes would be impacted by construction activities. Construction parking would be located at project staging areas; therefore, construction is not anticipated to affect existing parking areas or demand. No roads or bridges would be inundated by construction activities.

The increase in vehicle traffic during construction would contribute to a minor increased safety risk to motorists or other users of local roads and could increase the accident risk. A traffic management plan would be developed prior to construction to minimize potential safety risks.

Operation

There are no anticipated transportation impacts during operation because the project would cause little or no additional traffic on local or regional roadways.

4.17.4.5 Shoreline Protection for Public Lands and Facilities

Construction

Construction access to install shoreline protection at Wish Poosh Campground and Cle Elum River Campground would be via the paved Salmon La Sac Road. The Wish Poosh boat launch and wellhouse access roads would be raised utilizing materials from onsite, so no truck trips would be required. In Cle Elum River Campground, construction would also utilize materials from onsite so no truck trips would be required. Construction would occur during seasonal closure of the campground, so construction would not affect access to the campground.

Reclamation would install additional riprap along the three segments of the Salmon La Sac Road embankment (Section 2.4.3 and Figure 2-8). Access would be via the existing road with construction staging and equipment located on the reservoir side of the road. Through traffic would be maintained, but would be restricted to a single lane at times. Approximately 500 truckloads would be required to transport materials to the site, representing a temporary, negligible increase over existing traffic levels, which would return to normal following construction.

Access for shoreline stabilization construction activities on the west shoreline of the reservoir would be via barge or boat; therefore, no impacts would be anticipated on transportation systems.

The expected increase in truck shipments and transportation of workers to job sites would not disrupt traffic in the area or exceed road capacity. Construction would not require oversized vehicles and no weight or height limitations are likely to restrict access of construction equipment to the site. Therefore, no upgrades to existing roadways would be required to facilitate construction vehicle access. Reclamation expects that the overall increase in vehicle traffic would cause minor to moderate deterioration of local roads and Reclamation would require contractors to repair any damage and restore roadways to a condition similar to or better than that prior to construction. The increase in traffic delays would not impact the ability of emergency personnel to respond to an incident because there would be only short-term, intermittent delays for construction activities, and no road closures are planned.

Changes to existing access for pedestrians, snowmobiles, and bicycles along local roadways are not anticipated because no sidewalks, snowmobile routes, or bicycle routes would be impacted by construction activities. Construction parking would be located at project staging areas; therefore, construction is not anticipated to affect existing parking areas or demand. No roads or bridges would be inundated by construction activities.

The increase in vehicle traffic during construction would contribute to a minor increased safety risk to motorists or other users of local roads and could increase the accident risk. A traffic management plan would be developed prior to construction to minimize potential safety risks.

Operation

The project would result in little or no additional traffic on local or regional roadways, so there would not be transportation impacts during operations and maintenance.

4.17.4.6 Improve Aquatic Habitat at Stream Mouths

Construction

Access for aquatic habitat construction activities on the west shoreline of the reservoir would be via barge or boat; therefore, no impacts would be anticipated on transportation systems.

Operation

The project would result in no additional traffic on local or regional roadways, so there would not be transportation impacts during operations and maintenance.

4.17.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.17.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.17.4.1).

4.17.5.2 Additional Storage Capacity for Instream Flow

Impacts from using the additional storage capacity would be the same as Alternative 2 (Section 4.17.4.2).

4.17.5.3 Hybrid Shoreline Protection

Under Alternative 3, Reclamation would provide shoreline protection for the same areas as described under hybrid shoreline protection (Section 2.5.3.3). The impacts in these areas would be similar to those described for Alternative 2 (Section 4.17.4.3), but hybrid shoreline protection construction would require approximately 1,900 more truck trips to haul materials to the construction site than the 5,000 truck trips required for rock shoreline protection (Alternative 2). A total of 6,900 truck trips are anticipated for hybrid shoreline protection. Over the course of the construction period (generally August through October), this activity would equate to an estimated 84 trucks per day (or about 9 per hour) travelling along SR-903 or Lake Cle Elum Dam Road to and from I-90. Approximately 44 employees are expected to commute to the job site. Most workers would arrive in the morning and depart in the evening and 44 vehicles per hour were assumed to arrive between the hours of 7 and 9 a.m. and depart between the hours of 4 and 6 p.m.

Together, construction worker trips and delivery of materials would result in an estimated 53 roundtrips during peak hours. During the nonpeak hours, traffic would be lower because there would be less construction worker traffic. The 53 trips would represent a significant impact because the increase in vehicle traffic would exceed the threshold of 25 peak period roundtrips and could cause an increase in traffic delays on local roadways. However, Reclamation expects construction to occur in phases over a period of 5 years as funding becomes available, reducing the expected truck trips during any one construction year and making the impacts less than significant.

Construction would not require oversized vehicles and no weight or height limitations are likely to restrict access of construction equipment to the site. Therefore, no upgrades to existing roadways would be required to facilitate construction vehicle access. Reclamation expects that the overall increase in vehicle traffic would result in minor to moderate deterioration of local roads and would require contractors to repair any damage and restore roadways to a condition similar to or better than that prior to construction. The increase in traffic delays would not impact the ability of emergency personnel to respond to an incident, because there would be only short-term, intermittent delays for construction activities, and no road closures are planned.

Changes to existing access for pedestrians, snowmobiles, and bicycles along local roadways are not anticipated, because no sidewalks, snowmobile routes, or bicycle routes would be impacted by construction activities. Construction parking would be located at project staging areas; therefore, construction is not anticipated to affect existing parking areas or demand. No roads or bridges would be inundated by construction activities.

The increase in vehicle traffic during construction would contribute to a minor increased safety risk to motorists or other users of local roads, increasing the accident risk. A traffic management plan would be developed prior to construction to minimize potential safety risks.

4.17.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.17.4.4).

4.17.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.17.4.5).

4.17.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.17.4.6).

4.17.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.17.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.17.4.1).

4.17.6.2 Additional Storage Capacity for TWSA

Use of the additional storage capacity for TWSA would not impact transportation. Increased flows in the river would be small relative to existing river flows and would not impact downstream transportation infrastructure.

4.17.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.17.4.3).

4.17.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.17.4.4).

4.17.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.17.4.5).

4.17.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.17.4.6).

4.17.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.17.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.17.4.1).

4.17.7.2 Additional Storage Capacity for TWSA

Use of the additional storage capacity for TWSA would be the same as Alternative 4 (Section 4.17.6.2).

4.17.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.17.5.3).

4.17.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.17.4.4).

4.17.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.17.4.5).

4.17.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.17.4.6).

4.17.8 Mitigation Measures

Most construction activities have been scheduled to occur outside of the peak summer and winter recreation seasons when the potential for traffic conflicts could be higher. Mitigation measures to reduce transportation impacts would include maintaining access to properties, installing signs, marking detour routes, providing flaggers, and providing information to the public, school districts, and emergency service providers, including notifications in advance of construction activities. Reclamation would provide temporary signage for closures and construction access along Lake Cabins Road in accordance with the Federal Highway Administration Manual of Uniform Traffic Control Devices and the Washington State supplement. In addition, a traffic management plan would be developed prior to construction to minimize potential safety risks.

4.18 Socioeconomics

4.18.1 Methods and Impact Indicators

The impact analysis area for the socioeconomic analysis is the Yakima River basin region, encompassing Kittitas, Benton, Yakima, and Franklin counties (henceforth the "four-county study area"). The socioeconomic analysis developed for this study consists of estimates of the major impacts generated by the alternatives. An economic impact analysis focuses on estimating alternative-specific economic impacts on the study area’s local economy. The socioeconomic analysis reported here examines two elements of the Cle Elum Pool Raise Project that likely would generate economic impacts in the region and across the state:

- Spending associated with construction
- Economic activity associated with changes in agricultural production during severe drought years attributable to increased water availability.

This analysis does not quantify the market or nonmarket values of goods and services generated under the alternatives. It does describe these effects on values when relevant.

The analysis includes not only the initial or direct impact on the primary affected industries, but also the secondary impacts (multiplier effects) resulting from those industries, providing inputs to the directly affected industries (indirect effects) as well as household spending of income earned by those employed in the directly or indirectly impacted sectors of the economy (induced effects).

This analysis uses IMPLAN (Impact Analysis for PLANning) modeling software to examine the economic impacts of the project. IMPLAN is an input-output model that works by tracing how spending associated with a specific project circulates through the defined impact area. The analysis describes economic impacts in the four-county study area (Kittitas, Benton, Yakima, and Franklin counties), and across the rest of the State of Washington. As described in Section 3.18, Reclamation built input-output models for both study areas using 2012 IMPLAN data, the most recent available data.

The IMPLAN analysis uses the following types of economic impacts attributable to the project:

- ***Direct Impacts***. These impacts describe changes in economic activity directly tied to spending associated with the project (e.g., wages paid to local construction workers).
- ***Indirect Impacts***. These impacts occur as businesses buy from other businesses, oftentimes referred to as "supply-chain" impacts. They begin with changes in economic activity for businesses that supply directly affected businesses (e.g., the welding supply business that supplies or rents equipment to construction contractors). They continue as these businesses, in turn, purchase goods and services necessary to operate.
- ***Induced Impacts***. These impacts describe changes in economic activity attributable to changes in household income generated by direct and indirect impacts of the project (e.g., spending by local construction workers on consumer goods and services).

Reclamation distributed these expenditures among the industry sectors of the economies in the four-county study area and the State of Washington. Reclamation then applied the IMPLAN multipliers and calculated the direct, indirect, and induced impacts on output, personal income, and jobs in these two economies.

The impact indicators align with categories of market impacts identified and analyzed at the geographic scale of the four-county study area. At the local scale, any increase in income or employment could be significant, as could any negative effect on recreation opportunities or property values. Based on review of other Reclamation evaluations and consideration of the absolute size of the industrial sectors, a threshold of 1 percent of the overall economic or private activity associated with key areas of impact was established. A 1 percent threshold results in a large absolute number of jobs and total value of income and output, but a threshold below 1 percent is uncommon. Reclamation evaluates impacts at these thresholds at the industry sector (e.g., agriculture) level and the total of all sectors.

Three variables that measure economic activity (output, personal income, and jobs) describe each type of economic impact. Increases in these measures are positive impacts, while decreases in these measures correspond to negative impacts.

Section 3.18 further describes these measures. Reclamation measured impacts by comparison with the No Action Alternative. Table 4-33 lists impact indicators and significance criteria for socioeconomics.

Table 4-33. Socioeconomic Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Changes in output (the value of production)	Increase or decrease in sector output by 1 percent of overall economic activity
Changes in personal income	Increase or decrease in sector personal income by 1 percent of regional activity
Changes in employment	Increase or decrease in jobs in sector by 1 percent of regional activity

4.18.2 Summary of Impacts

Reconstruction of the interim fish passage facilities and construction of the two YRBWEP Phase II conservation projects and permanent fish passage facilities would result in minor direct increases in local employment associated with new construction jobs and support services. Prevailing factors that influence employment and the economy in the area would continue.

For the action alternatives, socioeconomic impacts are positive, resulting in a gain in regional economic activity. Construction would increase output in the short term. Alternatives 4 and 5 would increase agricultural production and market value during severe drought years, relative to the No Action Alternative. None of the impacts would be significant.

4.18.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, Reclamation would continue to operate Cle Elum Reservoir as it currently does. Reconstruction of the interim fish passage facilities and construction of the new permanent fish passage facilities combined with ongoing fish reintroduction would result in minor direct increases in local employment associated with new construction jobs and support services (Reclamation and Ecology, 2011b). The two YRBWEP Phase II conservation projects would result in minor direct increases in local employment during construction and would increase the reliability of irrigation water supply.

Generally, prevailing factors that influence employment in the area would continue, and there would be no additional construction-related impacts on output, employment, or personal income. Existing trends in the region would continue with no influence from the Cle Elum Pool Raise project. As Table 4-34 shows, agriculture employment is 36,100 and construction employment is 13,100 in the four-county area as of 2012. These levels are a slight decline from the 2009 employment numbers of 38,200 and 13,500, respectively. As the national and regional economy continues to recover, it is likely that these employment levels would stabilize and possibly improve.

Demand for vacation and residential housing and infrastructure would likely continue and grow as regional amenities outdoor recreation opportunities improve and the high percentage of sunny days attracts recreationists from areas west of the Cascades. As these amenities improve and experience greater recognition and demand, this demand would support multiple industrial sectors including service and construction. Improvements in aquatic habitat and fish populations as part of the No Action Alternative could improve fishing and wildlife viewing recreation opportunities, which could increase the overall number and length of recreation trips to Cle Elum Reservoir. Growth in the wine industry and other high-value crops as well as diversification into wine tourism should contribute to strength in the regional agriculture industry. Increased unreliability associated with water supply for proratable irrigation districts could cause a shift toward crops with lower irrigation needs, and potentially lower economic value.

4.18.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

Economic impacts associated with Alternative 2 would be minor, temporary, and primarily construction-related. Additional storage capacity for instream flow would have some currently unquantified but minor benefit for fish populations due to increased areas suitable for rearing during drought years.

4.18.4.1 Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Construction expenditures associated with the project would fuel economic activity in the four-county study area and across the state of Washington. These expenditures likely would also support economic activity outside of Washington. However, those impacts lie beyond the scope of this analysis.

Table 4-34 summarizes the economic impacts associated with radial gate modifications in the project. The impacts summarized in the table represent the sum of economic impacts of construction expenditures during the expected 1-year construction period. Direct output represents spending on labor, materials, equipment, and related items that take place in the two areas, totaling about $0.5 million within the four-county study area, and about $0.2 million across the rest of Washington. Direct personal income is a subset of direct output. It represents the portion of direct output going toward labor. In this case, labor includes workers on the construction site as well as the workers responsible for manufacturing and supplying the materials and equipment purchased for construction. Direct job years represent the years of full- and part-time employment supported by construction expenditures, including both workers on the construction site as well as the workers responsible for manufacturing and supplying the materials and equipment purchased for construction. Indirect impacts represent output, personal income, and employment responsible for supporting the direct economic impacts. Induced impacts represent the spending flowing from direct and indirect output and income.

Reclamation split impacts in the table above into three geographic categories in terms of where the impacts would take place: those that would occur within the four-county study area, those that would occur elsewhere in Washington, and those that would occur in Washington as a whole. Most of the direct impacts occur in the four-county study area. A larger share of the indirect and induced impacts occurs elsewhere in Washington, which illustrates the economic linkages between the economy in the four-county study area and that in the rest of the state.

Table 4-34. Summary of Economic Impacts, by Type and Geography, from Construction Expenditures for the Radial Gate Modification Portion of the Project

Region and Impact Measure	Direct	Indirect	Induced	Total
Four-County Region				
Output	$490,000	$57,000	$92,000	$639,000
Personal income	$322,000	$27,000	$30,000	$379,000
Job-years	5	1	1	7
Rest of Washington				
Output	$218,000	$89,000	$217,000	$524,000
Personal income	$73,000	$30,000	$74,000	$177,000
Job-years	1	1	2	3
Total Washington State				
Output	$707,000	$146,000	$309,000	$1,163,000
Personal income	$395,000	$57,000	$103,000	$556,000
Job-years	7	1	2	10

Note: Calculated with cost estimates for radial gate portion of Pool Raise Project and 2012 IMPLAN base data. Total Washington State is the sum of the first two categories. Totals may not sum due to rounding.

Table 4-35 shows the distribution of all impacts (direct, indirect, and induced) across different industry sectors within the four-county study area. Note that these impact measures are gross, and not net of some other potential expenditure of the cost funds. Given that the majority of the State and Federal funding for the project would not likely be spent in the larger region, but for more locally, these impacts are likely comparable to final net impacts. Similarly, because the magnitude of these impacts is low relative to the overall amount of employment, income, and output in the region, it is unlikely, on net, to have crowding effects on other economic activity. Consequently, these economic impact indicators likely do represent a strong estimation of the impact of the project, and these are positive market-based economic impacts.

The 7 estimated job years shown in Table 4-35 represent a small portion of the overall labor force in the region, and of the overall temporary housing capacity. In addition, it is unlikely that all labor would require housing. It is possible that one or two establishments might experience higher than usual occupancy during construction, but this seems unlikely, and if so, limited. While the construction season would correlate to tourism periods, the vicinity holds several motels in Cle Elum, Ellensburg, Yakima and elsewhere along I-90 and I-82[2].

Table 4-35. Distribution of Construction Impacts of Radial Gate Modification Portion of the Project by Industry Sector, Four-County Study Area

Industry Sector	Output	Personal Income	Job Years
Agriculture	$61,000	$19,000	1
Construction	$275,000	$254,000	4
Manufacturing	$41,000	$8,000	0
Trade	$142,000	$60,000	1
Service	$88,000	$31,000	1
Government	$5,000	$2,000	0
Other[1]	$26,000	$6,000	0
Total	$638,000	$380,000	7

Note: Calculated with cost estimates for radial gate portion of Pool Raise Project and 2012 IMPLAN base data. Totals may not sum due to rounding.

[1] Other includes Transportation, Information, Utilities, and Mining

Table 4-36 shows the economic impacts associated with impact indicators summarized in Table 4-35. The radial gate portion of the project would have minor impacts on output and employment in the four-county study area. The only impacts within a hundredth of a percent are for the construction industry, but those are still below the 1 percent significance threshold. These proportions with respect to the study area totals are based on the total project portion. Reclamation intends to construct the radial gates over a 5-year period. If construction occurs evenly over that time period, the impact indicators for any one year would be 1/5 of those in Table 4-36. Based on this assumption, the impacts shown here are upper estimates and likely would be lower in any given year.

The employment levels would not place a strain on the labor or housing supply. The employment associated with the radial gate modification portion of the project would be low and is therefore not likely to noticeably affect the temporary housing supply.

[2] There are 10 hotels and motels, 3 RV parks, and 29 campgrounds in Cle Elum. Including Ellensburg and Yakima increases the number of hotels and motels by an additional 26, based on Google Maps data.

Table 4-36. Economic Impact Indicators of Radial Gate Modification Portion of the Project, Four-County Study Area

Industry Sector	Output as Percent of Total	Employment as Percent of Total	Job Years as Percent of Total
Agriculture	0.00	0.00	0.00
Construction	0.01	0.04	0.03
Manufacturing	0.00	0.00	0.00
Trade	0.00	0.00	0.00
Service	0.00	0.00	0.00
Government	0.00	0.00	0.00
Other[1]	0.00	0.00	0.00
Total	0.00	0.00	0.00

Note: Totals may not sum due to rounding. These proportions with respect to the study area totals are based on the total project portion. With construction spread over 5 years, the indicators would be lower in any given year.
[1] Other includes Transportation, Information, Utilities, and Mining

4.18.4.2 Additional Storage Capacity for Instream Flow

The additional storage capacity for instream flow would have minor, unquantified beneficial effects on fish populations. The additional flows would increase the areas suitable for rearing during dry years. This might possibly increase recreational or commercial fishing activity. However, data are not available to quantify this potential impact.

4.18.4.3 Rock Shoreline Protection

Table 4-37 summarizes the economic impacts associated with constructing the rock shoreline protection portion of the project. These impacts would happen seasonally over a 5-year construction period. The total employment in the four-county study area would be 86 job years, with an additional 28 job years in the remainder of Washington State.

Table 4-38 summarizes the distribution of construction impacts for rock shoreline portion of the project across industry sectors in the four-county study area. The economic impacts would be concentrated in construction, followed by trade and service.

Table 4-37. Summary of Economic Impacts, By Type and Geography, from Construction Expenditures for the Rock Shoreline Protection Portion of the Project

Region and Impact Measure	Direct	Indirect	Induced	Total
Four-County Region				
Output	$6,493,000	$753,000	$1,177,000	$8,424,000
Personal income	$4,137,000	$243,000	$379,000	$4,758,000
Job-years	71	6	10	86
Rest of Washington				
Output	$1,395,000	$682,000	$2,216,000	$4,293,000
Personal income	$472,000	$202,000	$749,000	$1,423,000
Job-years	9	3	15	28
Total Washington State				
Output	$7,888,000	$1,435,000	$3,394,000	$12,717,000
Personal income	$4,609,000	$445,000	$1,128,000	$6,181,000
Job-years	81	9	25	115

Note: Calculated with cost estimates for rock shoreline portion of the Project and 2012 IMPLAN base data. Totals may not sum due to rounding.

Table 4-38. Distribution of Construction Impacts of Rock Shoreline Protection Portion of Project by Industry Sector, Four-County Study Area

Industry Sector	Output	Personal Income	Jobs
Agriculture	$44,000	$15,000	0
Construction	$2,989,000	$2,966,000	44
Manufacturing	$353,000	$32,000	1
Trade	$1,943,000	$800,000	19
Service	$1,253,000	$450,000	10
Government	$78,000	$39,000	1
Other[1]	$1,764,000	$456,000	11
Total	$8,424,000	$4,758,000	86

Note: Calculated with cost estimates for rock shoreline portion of the Project and 2012 IMPLAN base data. Totals may not sum due to rounding.

Other includes Transportation, Information, Utilities, and Mining

Table 4-39 compares the economic impacts summarized in Table 4-38 with the impact indicators. The rock shoreline protection portion of the project would have minor impacts on output and employment in the four-county study area. Impact indicators are greatest for the construction industry, but still less than the 1 percent significance threshold. These proportions with respect to the study area totals are based on the total project portion. Reclamation intends to construct the rock shoreline protection over a 5-year period. If construction occurs evenly over that time period, the impact indicators for any 1 year would be 1/5 of those in Table 4-39. Using this assumption, the economic impacts shown here are upper estimates and likely would be lower in any given year.

Table 4-39. Economic Impact Indicators of the Rock Shoreline Protection Portion of the Project, Four-County Study Area

Industry Sector	Output as Percent of Total	Employment as Percent of Total	Job Years as Percent of Total
Agriculture	0.00	0.00	0.00
Construction	0.15	0.48	0.34
Manufacturing	0.01	0.00	0.01
Trade	0.05	0.06	0.05
Service	0.01	0.01	0.01
Government	0.00	0.00	0.00
Other[1]	0.06	0.07	0.07
Total	0.02	0.04	0.03

Note: Totals may not sum due to rounding. These proportions with respect to the study area totals are based on the total project portion. With construction spread over 5 years, the indicators would be lower in any given year.
[1] Other includes Transportation, Information, Utilities, and Mining

The employment requirements would not place a strain on the labor or housing supply. The employment associated with the shoreline protection portion of the project would not be particularly specialized, and therefore is likely to be available locally and not represent a large portion of the labor pool.

4.18.4.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

The socioeconomic impacts of the increasing the freeboard on the saddle dikes and right dam abutment are included in the impacts of rock shoreline protection (Section 4.18.4.3).

4.18.4.5 Shoreline Protection for Public Lands and Facilities

The socioeconomic impacts of shoreline protection for public lands and facilities are included in the impacts of rock shoreline protection (Section 4.18.4.3).

4.18.4.6 Improve Aquatic Habitat at Stream Mouths

Labor requirements to implement aquatic habitat improvements at three stream mouths on the west shore of the reservoir would be minimal and have no measurable impact on employment in the study area. Construction activities would be by hand and involve no heavy equipment or require new access. These activities are not likely to have impacts on employment or disrupt other activities.

4.18.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.18.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.18.4.1).

4.18.5.2 Additional Storage Capacity for Instream Flow

Impacts would be the same as for Alternative 2 (Section 4.18.4.2).

4.18.5.3 Hybrid Shoreline Protection

Table 4-40 summarizes the economic impacts associated with constructing the hybrid shoreline protection. These impacts would happen over a 5-year construction period. The total employment in the four-county study area would be 87 job years, with an additional 28 job years in the remainder of Washington State.

Table 4-40. Summary of Economic Impacts, By Type and Geography, from Construction Expenditures for the Hybrid Shoreline Protection Portion of the Project

Region/Impact Measure	Direct	Indirect	Induced	Total
Four-County Region				
Output	$6,507,000	$755,000	$1,177,000	$8,439,000
Personal Income	$4,221,000	$257,000	$379,000	$4,856,000
Job Years	71	6	10	87
Rest of Washington				
Output	$1,340,000	$646,000	$2,270,000	$4,256,000
Personal Income	$460,000	$197,000	$767,000	$1,424,000
Job Years	8	3	16	28
Total Washington State				
Output	$7,848,000	$1,400,000	$3,447,000	$12,695,000
Personal Income	$4,680,000	$454,000	$1,146,000	$6,280,000
Job Years	80	9	25	115

Note: Calculated with cost estimates for hybrid shoreline portion of the Project and 2012 IMPLAN base data. Totals may not sum due to rounding.

Table 4-41 summarizes the distribution of construction impacts for the hybrid shoreline protection portion of the project across industry sectors in the four-county study area. The economic impacts would be concentrated in construction, followed by trade and service.

Table 4-41. Distribution of Construction Impacts of Hybrid Shoreline Protection Portion of Project by Industry Sector, Four-County Study Area

Industry Sector	Output	Personal Income	Job Years
Agriculture	$143,000	$46,000	1
Construction	$3,112,000	$3,090,000	46
Manufacturing	$261,000	$17,000	0
Trade	$1,865,000	$771,000	18
Service	$1,251,000	$450,000	10
Government	$77,000	$38,000	1
Other[1]	$1,729,000	$445,000	11
Total	$8,439,000	$4,856,000	87

Note: Calculated with cost estimates for hybrid shoreline portion of the Project and 2012 IMPLAN base data. Totals may not sum due to rounding.
[1] Other includes Transportation, Information, Utilities, and Mining

Table 4-42 compares the economic impacts summarized in Table 4-40 with the impact indicators. Hybrid shoreline protection would have minor impacts on output and employment in the four-county study area. Economic impacts would be greatest for the construction industry, but still less than the 1 percent significance threshold. These proportions with respect to the study area totals are based on the total project portion. Reclamation intends to construct the rock shoreline protection over a 5-year period. If construction occurs evenly over that time period, the impact indicators for any 1 year would be 1/5 of those in Table 4-42. Using this assumption, the economic impacts shown here are upper estimates and likely would be lower in any given year.

The employment would not place a strain on the labor or housing supply. The employment associated with the radial gate modification portion of the project would be low and is therefore not likely to noticeably affect the temporary housing supply.

Table 4-42. Economic Impacts of the Hybrid Shoreline Protection Portion of the Project, Four-County Study Area

Industry Sector	Output as Percent of Total	Employment as Percent of Total	Job Years as Percent of Total
Agriculture	0.00	0.00	0.00
Construction	0.15	0.50	0.35
Manufacturing	0.00	0.00	0.00
Trade	0.05	0.06	0.05
Service	0.01	0.01	0.01
Government	0.00	0.00	0.00
Other[1]	0.05	0.07	0.07
Total	0.02	0.04	0.03

Note: Totals may not sum due to rounding. These proportions with respect to the study area totals are based on the total project portion. With construction spread over 5 years, the indicators would be lower in any given year.
[1] Other includes Transportation, Information, Utilities, and Mining

4.18.5.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

The socioeconomic impacts of the increasing the freeboard on the saddle dikes and right dam abutment are included in the impacts of hybrid shoreline protection (Section 4.18.5.3).

4.18.5.5 Shoreline Protection for Public Lands and Facilities

The socioeconomic impacts of shoreline protection for Federal recreation facilities and access are included in the impacts of hybrid shoreline protection (Section 4.18.5.3).

4.18.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.18.4.6).

4.18.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.18.6.1 Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.18.4.1). Similarly, the net impacts would be positive with no likely negative labor or housing impacts.

4.18.6.2 Additional Storage Capacity for TWSA

Changes in Agricultural Production

Use of the additional storage capacity for TWSA would increase the overall water supply so the amount of water available to proratable irrigators during severe drought years would increase, on average, from 48.1 percent to 48.6 percent of their full entitlement. With more water available during severe drought years, this alternative would increase agricultural production and market value during severe drought years, relative to the No Action Alternative. To model the economic impacts of changes in agricultural output during severe drought years, the analysis included estimates of the effect of Alternative 4 on gross farm earnings, distribution across the appropriate types of crops, and allocation to the corresponding agricultural industry sectors in the IMPLAN model. Note that the model run utilized for this analysis does not incorporate any conservation or trading activity beyond what is already occurring in the basin.

Table 4-43 summarizes the economic impacts associated with the change in agricultural production attributed to the use of additional storage capacity for TWSA in a typical severe drought year. Since the entirety of the change in agricultural production occurs within the four-county study area, by definition, all direct economic impacts also occur within this area. Direct output represents the difference between gross farm earnings during a severe drought year with this alternative and gross farm earnings without it. These impacts would occur over a 1-year period. The total employment impact in the four-county study area would be 72 job years, with an additional 3 job years in the remainder of Washington State.

Table 4-43. Summary of Economic Impacts, by Type and Geography, from Agricultural Production Associated with Increased Water Storage During a Severe Drought Year

Region/Impact Measure	Direct	Indirect	Induced	Total
Four-County Region				
Output	$5,523,000	$1,951,000	$2,122,000	$9,596,000
Personal Income	$944,000	$938,000	$594,000	$2,476,000
Job Years	27	28	17	72
Rest of Washington				
Output	$0	$408,000	$239,000	$647,000
Personal Income	$0	$72,000	$59,000	$130,000
Job Years	0	2	1	3
Total Washington State				
Output	$5,523,000	$2,359,000	$2,361,000	$10,243,000
Personal Income	$944,000	$1,010,000	$653,000	$2,606,000
Job Years	27	30	19	75

Note: Calculated using a spreadsheet model of direct irrigation benefits and 2012 IMPLAN base data. Totals may not sum due to rounding.

To calculate the indirect and induced impacts of this change in agricultural production, Reclamation ran direct impacts through IMPLAN. The impacts in the table do not include downstream impacts tied to agricultural production during drought years, such as food processing, transportation, and restaurant sales. In total, the impact of Alternative 4 on agricultural production during a severe drought year would generate about $9,596,000 in output within the four-county study area. Of that output, about $2,476,000 would go toward personal incomes that would support about 72 job years.

Table 4-44 shows distribution of these impacts (direct, indirect, and induced) in the four-county study area during a severe drought year across different industry sectors. Most of the economic impacts associated with an increase in agricultural production during drought years would stay in the agricultural sector, accounting for roughly 65 percent of the total change in output, 66 percent of the increase in personal income, and 68 percent of jobs created. A large share of the impacts would also accrue to the service sector, with roughly 20 percent of the total increase in output, personal incomes, and jobs.

Table 4-44. Distribution of Economic Impacts of Increased Agricultural Production During a Severe Drought Year, by Industry Sector, Four-County Study Area

Industry Sector	Output	Personal Income	Job Years
Agriculture	$6,190,000	$1,627,000	49
Construction	$81,000	$28,000	1
Manufacturing	$459,000	$35,000	1
Trade	$503,000	$166,000	5
Service	$1,925,000	$498,000	14
Government	$171,000	$69,000	1
Other[1]	$267,000	$53,000	1
Total	$9,596,000	$2,476,000	72

Note: Calculated using a spreadsheet model of direct irrigation benefits and 2012 IMPLAN base data. Totals may not sum due to rounding.
[1] Other includes Transportation, Information, Utilities, and Mining

The value of increased agricultural output for a similar change, but under less severe conditions (for example, an 80.0 percent to 80.5 percent increase in water supply availability), would be less than under a severe drought. This is because the more scarce the water supply, the more valuable the available opportunities to increase agriculture production with increased water supply.

Table 4-45 shows the economic impacts summarized in Table 4-42 in relation to the impact indicators. The increased water supply portion of the project would have minor impacts on output and employment in the four-county study area. Impacts are greatest for the agriculture industry, but still less than the 1 percent significance threshold.

Table 4-45. Economic Impacts of Increased Agricultural Production During a Severe Drought Year, Four-County Study Area

Industry Sector	Output as Percent of Total	Employment as Percent of Total	Job Years as Percent of Total
Agriculture	0.15	0.16	0.15
Construction	0.00	0.00	0.01
Manufacturing	0.01	0.00	0.01
Trade	0.01	0.01	0.01
Service	0.01	0.01	0.01
Government	0.00	0.00	0.00
Other[1]	0.01	0.01	0.01
Total	0.02	0.02	0.03

Note: Totals may not sum due to rounding.
[1] Other includes Transportation, Information, Utilities, and Mining

The employment would not place a strain on the labor or housing supply. The employment associated with the increased water supply for agriculture during drought conditions would still be within the range of employment requirements during non-drought conditions, which is the more common condition.

4.18.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.18.4.3). Similarly, the net impacts would be positive with no likely negative labor or housing impacts.

4.18.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

The socioeconomic impacts of the increasing the freeboard on the saddle dikes and right dam abutment are included in the impacts of rock shoreline protection (Section 4.18.4.3).

4.18.6.5 Shoreline Protection for Public Lands and Facilities

The socioeconomic impacts of shoreline protection for Federal recreation facilities and access are included in the impacts of rock shoreline protection (Section 4.18.4.3).

4.18.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.18.4.6).

4.18.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.18.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.18.4.1). Similarly, the net impacts would be positive with no likely negative labor or housing impacts.

4.18.7.2 Additional Storage Capacity for TWSA

Impacts would be the same as for Alternative 4 (Section 4.18.6.2).

4.18.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.18.5.3).

4.18.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

The socioeconomic impacts of the increasing the freeboard on the saddle dikes and right dam abutment are included in the impacts of hybrid shoreline protection (Section 4.18.4.3).

4.18.7.5 Shoreline Protection for Public Lands and Facilities

The socioeconomic impacts of shoreline protection for Federal recreation facilities and access are included in the impacts of hybrid shoreline protection (Section 4.18.4.3).

4.18.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.18.4.6).

4.18.8 Mitigation Measures

All of the short-term and long-term cost based socioeconomic impacts are positive, resulting in a gain in regional economic activity. Thus, all of the action alternatives are unlikely to result in adverse impacts on socioeconomic resources. Therefore, there is no need for mitigation.

4.19 Cultural Resources

4.19.1 Methods and Impact Indicators

As defined by Federal regulations, cultural resources deemed significant are subject to additional determination of effects and the design of special mitigation measures. The "Criteria of Adverse Effect" (36 CFR 800.5) are used to determine whether a proposed action would affect a historic property. Any element of an action would have an adverse effect if it changes the characteristics that qualify a historic property for inclusion in the National Register of Historic Places (NRHP) in a manner that would diminish the integrity of that property. Potential adverse effects include the following:

- Physical impact on a historic property or cultural resource, through agents such as inundation and shoreline fluctuation
- Damage or alteration of a portion of a historic property, or removal or modification of a portion of the property
- Introduction of audible, visible, or atmospheric elements that are out of character with the historic property or alter its setting

Each of these adverse effects could accompany implementation of the action alternatives. Reclamation analyzed impacts on cultural and historic resources by conducting a literature review, an NRHP effects assessment of Cle Elum Dam, and a preliminary, on-the-ground cultural resource survey of Cle Elum Reservoir shoreline to estimate the extent of impact the alternatives would have on cultural or historic resources.

The Area of Potential Effect (APE) for the Cle Elum Pool Raise Project consists of approximately 300 acres along the perimeter of Cle Elum Reservoir that encompassing the areas subject to increased inundation, shoreline protection and protection for recreation facilities. The APE is shown in Figure 3-17.

Cultural resource surveys described in Section 3.19 provided the impact indicators used in this analysis to report potential for impact to cultural resources. Table 4-46 shows these indicators.

Table 4-46. Cultural Resources Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Impact to defining historic characteristics of Cle Elum Dam with the modification of radial gates and associated construction activities	Changes the characteristics that qualify a historic property for inclusion in the NRHP in a manner that would diminish its integrity
Installing shoreline protection and associated construction where cultural resources exist	Disturbance of a cultural item protected under the Native American Grave Protection and Repatriation Act (NAGPRA) or NRHP; or prevention of access to or disturbance of a sacred site
Additional acreage where cultural resources exist, impacted by increased reservoir pool at Cle Elum Reservoir, and additional shoreline fluctuation	Disturbance of a cultural item protected under the Native American Grave Protection and Repatriation Act (NAGPRA) or NRHP; or prevention of access to or disturbance of a sacred site

4.19.2 Summary of Impacts

Reconstruction of the interim fish passage facilities would not affect cultural resources because the facilities would be reconstructed on the dam spillway and would have a similar appearance to the existing facilities. The two YRBWEP Phase II conservation projects are located in developed agricultural areas and are not likely to impact cultural resources. Construction of new permanent fish passage facilities as part of the No Action Alternative would have an adverse effect on NRHP-eligible resources (Reclamation and Ecology, 2011b).

The action alternatives, since they involve similar structural elements, would adversely impact cultural resources to an equal extent. It is Reclamation's policy to prevent impacts on cultural resources whenever possible. However, to meet the purpose and need of the project, some impacts are unavoidable. Section 4.19.8 describes the process to resolve adverse effects.

All of the action alternatives involve significant changes to a historic structure (Cle Elum Dam). The increased reservoir pool and associated shoreline protection measures, whether the additional storage capacity is used for instream flows or for TWSA, would similarly impact archaeological resources along the shoreline of Cle Elum Reservoir.

The Yakama Nation Cultural Resource study identifies the likelihood that existing reservoir operations impact cultural resources, including traditional cultural properties (TCPs) (Yakama Nation Cultural Resources Program, 2014). Each of the proposed action alternatives would contribute to the impacts. Section 4.19.8 addresses these impacts, and the measures Reclamation would take to resolve them.

4.19.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, Reclamation would reconstruct the existing interim fish passage facilities and construct new permanent fish passage facilities. Reclamation has completed cultural resources review on the replacement of the existing interim fish passage facilities and determined that there is no potential to cause effects to historic properties.

For the new permanent fish passage facilities, Reclamation has determined that NRHP-eligible resources are present, and reached a determination of adverse effect. Archaeological and historical resources within the Cle Elum Pool Raise Project APE would be impacted. Reclamation, in consultation with the SHPO, Yakama Nation, and Colville Confederated Tribes, has entered into a Memorandum of Agreement (MOA) to resolve the adverse effects of the permanent fish passage facilities. The MOA stipulates that Reclamation will conduct archaeological data recovery and ethnohistorical documentation. Reclamation is currently conducting that work. Reclamation will also prepare historical interpretive materials (Reclamation and Ecology, 2011b; Reclamation, 2015a).

The two YRBWEP Phase II conservation projects are located in developed agricultural areas and are not likely to impact cultural resources. The projects would comply with applicable Federal and State laws regarding the inadvertent discovery of cultural resources.

4.19.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

4.19.4.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Radial Gate Modifications

Anticipated construction (i.e., short-term) impacts related to the radial gate modifications are limited and in and of themselves pose little or no impact on cultural resources. However, as indicated in Section 3.19, Cle Elum Dam, including the radial gates and spillway, is eligible for inclusion on the NRHP (NRHP-eligible). The existing radial gates, also known as the "Tainter Gates," have remained relatively unchanged since installation and, as indicated in Section 3.19.3, are character-defining historic features of Cle Elum Dam. The structural modification changes the original design of the Tainter Gates and the appearance of the spillway. Therefore, the proposed action constitutes an adverse effect to the character-defining features of the dam. The SHPO has concurred with the adverse effect determination. Section 4.19.8 describes the process to resolve adverse effects.

Increased Reservoir Pool

Raising the reservoir pool would result in increased inundation and shoreline fluctuation, as indicated in Section 4.2.4. The physical impacts from these actions can result in degradation of archaeological and historical sites present in areas of additional inundation. The preliminary survey identified one NRHP-eligible archaeological site in the Area of Potential Effect (APE), currently impacted by inundation and shoreline fluctuation. The increased water level and inundation posed by the Proposed Action would compound the impacts on the archaeological site. It is possible that subsequent surveys would identify additional cultural resources impacted by increased water level and inundation. Reclamation considers these effects adverse. The SHPO has concurred with the adverse effect determination. Section 4.19.8 describes the process to resolve adverse effects.

4.19.4.2 Additional Storage Capacity for Instream Flow

Using the additional storage capacity for instream flow would not impact cultural resources.

4.19.4.3 Rock Shoreline Protection

Preliminary surveys have not identified cultural resources in the areas subject to rock shoreline protection. However, Reclamation has not yet evaluated the full APE of the protection (including rock sources and construction impacts). Reclamation would conduct additional surveys as necessary. Reclamation considers it likely that cultural resources are present. If a planned action could adversely affect an NRHP-eligible archeological, historical, or traditional cultural property site, Reclamation would investigate options to avoid the site, such as selecting an alternate materials source or redesigning the structural features. In the event that avoidance is not possible, protective or mitigative measures would be developed and considered, as described in Section 4.19.8.

4.19.4.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Preliminary surveys have not identified cultural resources in the areas subject to construction to raise the saddle dikes and right dam abutment, and Reclamation anticipates construction would pose little or no impact on cultural resources. However, Reclamation has not yet evaluated the full APE of the construction (e.g., borrow and riprap sources, access roads) and additional surveys may be required. If Reclamation identifies cultural resources, the agency would follow the procedures described under rock shoreline protection.

As indicated in Section 3.19, Cle Elum Dam is eligible for inclusion on the NRHP. For NHPA purposes, the right dam abutment is associated with the modification of the radial gates as described under Section 4.19.4.1.

4.19.4.5 Shoreline Protection for Public Lands and Facilities

Preliminary surveys have not identified cultural resources in the areas subject to shoreline protection for public lands and facilities. However the full APE of the protection (including construction impacts) has not yet been evaluated and additional surveys are ongoing. If Reclamation identifies cultural resources, the agency would follow procedures as described under rock shoreline protection.

4.19.4.6 Improve Aquatic Habitat at Stream Mouths

Preliminary surveys have not identified cultural resources in the areas subject to aquatic habitat improvements. However the full APE of the protection (including construction impacts) has not yet been evaluated and additional surveys are ongoing. If Reclamation identifies cultural resources, the agency would follow procedures as described under rock shoreline protection.

4.19.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

4.19.5.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.19.4.1).

4.19.5.2 Additional Storage Capacity for Instream Flow

Using the additional storage capacity for instream flow would not impact cultural resources.

4.19.5.3 Hybrid Shoreline Protection

Reclamation has identified no cultural resources in the areas subject to hybrid shoreline protection. However, surveys thus far are preliminary and Reclamation has not yet evaluated the full APE of the shoreline protection (including lakebed soil sources, log salvage locations, and construction impacts). Reclamation would conduct additional surveys as necessary. If Reclamation identifies cultural resources, the agency would follow procedures as described under rock shoreline protection.

4.19.5.4 Increase Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.19.4.4).

4.19.5.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.19.4.5).

4.19.5.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.19.4.6).

4.19.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

4.19.6.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.19.4.1).

4.19.6.2 Additional Storage Capacity for TWSA

Use of the additional storage capacity for TWSA would not impact cultural resources.

4.19.6.3 Rock Shoreline Protection

Impacts would be the same as for Alternative 2 (Section 4.19.4.3).

4.19.6.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.19.4.4).

4.19.6.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.19.4.5).

4.19.6.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.19.4.6).

4.19.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

4.19.7.1 Spillway Radial Gate Modifications to Raise the Reservoir Level

Impacts from radial gate modifications and from the increased reservoir pool would be the same as for Alternative 2 (Section 4.19.4.1).

4.19.7.2 Additional Storage Capacity for TWSA

Use of the additional storage capacity for TWSA would not impact cultural resources.

4.19.7.3 Hybrid Shoreline Protection

Impacts would be the same as for Alternative 3 (Section 4.19.5.3).

4.19.7.4 Increased Freeboard of Saddle Dikes and Right Dam Abutment

Impacts would be the same as for Alternative 2 (Section 4.19.4.4).

4.19.7.5 Shoreline Protection for Public Lands and Facilities

Impacts would be the same as for Alternative 2 (Section 4.19.4.5).

4.19.7.6 Improve Aquatic Habitat at Stream Mouths

Impacts would be the same as for Alternative 2 (Section 4.19.4.6).

4.19.8 Mitigation

As described in Section in 3.19.1, Reclamation is conducting cultural resources compliance for the Cle Elum Pool Raise Project concurrently with NEPA compliance. Reclamation, as lead federal agency, is complying in accordance with 36 CFR Part 800.8 of the Section 106 implementing regulations, entitled *Coordination with the National Environmental Policy Act*. Reclamation is in consultation with the SHPO, Yakama Nation, Colville Confederated Tribes, and USFS. As a result of studies conducted by Reclamation and the Yakama Nation, Reclamation has determined the Cle Elum Pool Raise Project would have adverse effects to historic properties. The SHPO has concurred with these determinations in letters dated August 14, 2014 and February 9, 2015 (see Section 5.4.3).

Reclamation would refine the cultural resources impacts analysis as a result of forthcoming surveys. For instance, the entire Cle Elum shoreline and all of the shoreline protection features have yet to be fully inventoried. However, the existing analysis is sufficient to characterize the scale of impacts and to evaluate the alternatives in relationship to each other. And, as indicated in Section 3.19, the Yakama Nation Cultural Resources Program, in its preliminary cultural resources survey, suggests that the glacial lake and associated precontact archaeological resources may qualify as TCPs. However, the Proposed Action has no immediate effect on nonarchaeological TCPs. Rather the effects to TCP values are cumulative in nature.

Reclamation is completing additional field surveys and studies to identify cultural and historic resources as project designs are refined. Reclamation is conducting all necessary consultation with the SHPO, the USFS, and involved Tribes in the event the agency makes a decision to implement one of the action alternatives. As indicated above, it is Reclamation's policy to prevent impacts on historic resources whenever possible. In the event that avoidance is not possible, Reclamation would develop and consider protective or mitigative measures.

For those cultural resources immediately and unavoidably affected by project implementation, as displayed under the impact indicators above, Reclamation would develop and implement a treatment plan. In the case of the modifications to the Tainter Gates, this may involve examining ways to reduce impacts through design modifications or Historic Engineering Record documentation supplemented with a public interpretation program. In the case of archaeological resources, treatment would involve additional site documentation and mapping to better determine the nature and extent of the affected resource, followed by site stabilization or archaeological data recovery as determined necessary. Reclamation would precede any proposed actions to resolve adverse effects by consultation with SHPO, the USFS, involved Indian Tribes, and the Federal Advisory Council on Historic Preservation, as necessary.

For those cultural resources affected by the long-term management or cumulative effects, Reclamation would prepare and implement a Cultural Resources Management Plan (CRMP) to address ongoing and future operational and land management implications if one of the action alternatives is carried forward. This would address the long-term and cumulative effects on the full range of cultural resources, including archaeological sites, historic structures and objects, and TCPs. Through this regulatory effort, Reclamation would define appropriate impact avoidance and mitigation, and long-term management objectives.

Reclamation would develop and maintain a CRMP for the Cle Elum Pool Raise Project within 5 years of issuance of the Record of Decision. The CRMP would include the following elements, as recommended in part by the Yakama Cultural Resources Program study:

- Within a schedule determined through consultation and as conditions allow, survey the drawdown zone of the reservoir to accurately determine the effects of reservoir drawdown, including studies to measure soil displacement and sorting caused by operations and the resultant effects on archaeological sites.
- Update the previously known sites within the drawdown zone. DAHP and USFS would provide site data and make the data available to the archaeological community.
- In addition to site updates, determine eligibility for each site. The drawdown zone of the reservoir reportedly contains numerous potentially eligible sites that Reclamation has not fully evaluated.
- The historic lake and associated precontact archaeological resources may qualify as TCPs. Reclamation would conduct a study to identify and evaluate TCP values of the historic lake and its environs and examine associations of precontact habitation and resource procurement sites at historic Cle Elum Lake to each other. Reclamation would also examine possible linkages with the occupation of the ethnographic village of Tle’lam.
- In regards to historic Euro-American structures and sites, record or update site records to reflect their historic associations, making maximum use of General Land Office maps and other archival sources. Record historic homesteads in a manner that appropriately reflects the community the resources represent.
- Develop management prescriptions based upon site condition and risk of damage, including a decision matrix to assist in appropriate treatment measures.
- Reclamation and Ecology can add elements of a CRMP and integrate them as appropriate if the agencies carry forward other components of the Integrated Plan, such as the Keechelus-to-Kachess Conveyance and Kachess Drought Relief Pumping Plant.

In all cases, cultural resources management actions would be implemented using methods consistent with the Secretary of the Interior’s Standards and Guidelines.

4.20 Indian Sacred Sites

4.20.1 Methods and Impact Indicators

Impact indicators for Indian sacred sites are the potential for disturbing or limiting access to such sites.

4.20.2 No Action Alternative

Reclamation anticipates no impacts on Indian sacred sites under the No Action Alternative. To date, Reclamation has identified no Indian sacred sites in the project area where reconstruction of the existing interim fish passage facilities, construction of the two YRBWEP Phase II conservation projects, construction of permanent fish passage facilities, or release of reintroduced fish would occur (Reclamation and Ecology, 2011b).

4.20.3 Cle Elum Pool Raise Project

To date, Reclamation has identified no Indian sacred sites in the project area. However, consultation with affected Tribes is ongoing and may result in future identification. If this occurs, Reclamation would further evaluate impacts on these resources.

4.20.4 Mitigation Measures

Reclamation's policy is to avoid impacts on Indian sacred sites whenever possible. Additional efforts to identify sacred sites would occur as a part of the cultural resources survey described in Section 4.19. Consultation with the Yakama Nation and the Umatilla and Colville Confederated Tribes would identify how to protect sacred sites if they were identified and how to provide continued access if any such sites were affected by construction.

4.21 Indian Trust Assets

4.21.1 Methods and Impact Indicators

Impact indicators for Indian Trust Assets (ITAs) are the potential for affecting ITAs. To identify ITAs in the project area, Reclamation consulted with the Yakama Nation, Colville Confederated Tribes, and BIA; no ITAs were identified.

4.21.2 No Action Alternative

Reclamation anticipates no impacts on ITAs from No Action Alternative activities because Reclamation and the affected Tribes identified none in the project area.

4.21.3 Cle Elum Pool Raise Project

Because consultation has not identified ITAs in the project area, Reclamation anticipates no impacts on ITAs under any of the action alternatives.

4.21.4 Mitigation Measures

If Reclamation identifies ITAs during future consultation, Reclamation would comply with its Indian Trust Assets Policy (July 2, 1993) that states impacts on ITAs would be avoided whenever possible.

4.22 Environmental Justice

4.22.1 Methods and Impact Indicators

The analysis of environmental justice evaluated the following issues to determine potential impacts regarding environmental justice:

- Do minority or low-income populations use affected resources?
- Do adverse environmental, human health, or economic impacts disproportionately impact minority or low-income populations?

This analysis used census data to determine the demographic makeup of residents of the project area (Section 3.22). Negative impacts would occur if the project disproportionally impacts minority or low-income populations residing in the area. The analysis also considered whether the project disproportionally impacts minority or low-income populations recreating in the area. The impact analysis area for environmental justice is Kittitas County Census Tract 9751, which includes Cle Elum Reservoir and the entire project area. Impact indicators and significance criteria are noted in Table 4-47.

Table 4-47. Environmental Justice Impact Indicators and Significance Criteria

Impact Indicator	Significance Criteria
Minority or low-income populations in the area are disproportionally subject to adverse environmental, human health, or economic impacts	Construction impacts would disproportionately affect minority or low-income populations Higher reservoir levels would disproportionately affect minority or low-income populations Private property or easements are disproportionately acquired from minority or low-income populations

4.22.2 Summary of Impacts

The No Action Alternative would not cause direct impacts on environmental justice. Reconstruction of the existing fish passage facility, construction of the two YRBWEP Phase II conservation projects, construction of the new facility and the ongoing fish reintroduction program would not cause environmental justice impacts (Reclamation and Ecology, 2011b).

Alternatives 2 through 5 would not result in impacts that would disproportionately affect minority or low-income populations through construction impacts, higher reservoir levels, or disproportionate acquisition of private property or easements. The project would affect all populations present in the area equally.

4.22.3 Alternative 1 – No Action Alternative

Under the No Action Alternative, reconstruction of the interim fish passage facilities and construction of the permanent fish passage facilities would not affect resources disproportionately used by minority or low-income populations, and minority and low-income populations would not be disproportionately subject to adverse environmental, human health, or economic impacts. The Cle Elum Dam Fish Passage EIS found that permanent fish passage facilities and the fish reintroduction project would have no environmental justice impact (Reclamation and Ecology, 2011b). Construction of the two YRBWEP Phase II conservation projects would not disproportionately impact minority or low-income populations.

4.22.4 Alternative 2 – Additional Storage Capacity for Instream Flow and Rock Shoreline Protection

Most impacts associated with the Cle Elum Pool Raise Project would be minor, temporary, and primarily construction-related. The project would affect resources including earth, fish, threatened and endangered species, land use, and recreation. The immediate geographic area potentially affected by the Cle Elum Pool Raise Project has lower percentages of minority and low-income populations than the Yakima River basin counties or the State of Washington (Section 3.22). The project would have no disproportionate adverse impact on those populations; the project would affect everyone in the area equally.

The project would not cause long-term impacts on developed recreational facilities or uses. Reclamation would address potential impacts on recreational facilities from inundation with shoreline protection measures included as part of the project. Impacts would occur to dispersed camping, but would not be significant (Section 4.14.4.1) and would not disproportionately affect minority or low-income populations. Temporary construction-related impacts to recreation at Speelyi Beach Boat Launch and Day Use Area, the associated dispersed recreation activities at Speelyi Beach, and the adjacent privately-owned Pineloch Sun Beach Club facility would not disproportionately impact minority or low-income populations.

The higher reservoir levels would inundate some areas of private property and increase the potential for shoreline erosion. Reclamation would provide shoreline protection for erosion and would acquire property or easements for inundated private land. Though no information is available on demographics of property owners, census information from the Cle Elum Reservoir area shows that the immediate geographic area has a lower percentage of minority and low-income populations than the Yakima River basin counties or the State of Washington. Higher reservoir levels would have no disproportionate impact on minority or low-income populations and private property or easements would not be disproportionately acquired from minority or low-income populations; the project would affect everyone in the area equally.

The project would not affect resources disproportionately used by minority or low-income populations, and minority and low-income populations would not be disproportionately subject to adverse environmental, human health, or economic impacts.

4.22.5 Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection (Preferred Alternative)

Impacts would be the same as for Alternative 2 as described in Section 4.22.4.

4.22.6 Alternative 4 – Additional Storage Capacity for TWSA and Rock Shoreline Protection

Impacts would be the same as for Alternative 2 as described in Section 4.22.4.

4.22.7 Alternative 5 – Additional Storage Capacity for TWSA and Hybrid Shoreline Protection

Impacts would be the same as for Alternative 2 as described in Section 4.22.4.

4.22.8 Mitigation Measures

The project would not have adverse environmental justice impacts. Therefore, there is no need for mitigation.

4.23 Relationship of the Pool Raise Project to the Integrated Plan

This section is included for SEPA compliance to summarize how the Cle Elum Pool Raise Project meets the goals of the Integrated Plan. As described in Chapter 1, Reclamation and Ecology identified the Cle Elum Pool Raise Project as one of the projects necessary to help address water needs in the Yakima River basin.

The Cle Elum Pool Raise Project supports the goals of the Integrated Plan by providing additional storage and increasing the volume of water available for instream flows to benefit fisheries or, if authorized, for proratable water users during drought years. Improved streamflows with any of the instream flow scenarios would benefit fish, including ESA-listed bull trout and MCR steelhead. If Reclamation allocated the additional storage capacity for TWSA, it would increase the amount of water available to proratable water users by up to 1.6 percent. Listed below are the specific goals of the Integrated Plan supported by the Cle Elum Pool Raise Project:

- Provide opportunities for comprehensive watershed protection, ecological restoration, and enhancement, addressing instream flows, aquatic habitat, and fish passage
- Improve water supply reliability during drought years for agricultural and municipal needs (if authorized by Congress)
- Improve the ability of water managers to respond and adapt to potential effects of climate change
- Contribute to the vitality of the regional economy and sustain the riverine environment.

The Cle Elum Pool Raise Project is an important component of the Integrated Plan’s proposed reservoir releases to meet reach-specific target flows for fish recommended by fish biologists and agency representatives (see Section 5.3.2.1 of the Integrated Plan PEIS). The Integrated Plan includes recommended instream flows for specific reaches of rivers and streams affected by the operation of the Yakima Project. Providing additional instream flow in the Cle Elum River during winter is a high priority. Implementation of the instream flow scenarios would benefit fish by increasing streamflows during crucial times and improving operation of the proposed permanent fish passage facilities.

If Reclamation implemented the Cle Elum Pool Raise Project without implementing the other projects in the Integrated Plan, the additional storage capacity would benefit instream flows in the Cle Elum and Yakima rivers or would contribute incrementally to meeting water supply goals during drought years. If Reclamation implemented the other projects included in the Integrated Plan without the Cle Elum Pool Raise Project, benefits to anadromous and resident species in the Cle Elum and Yakima rivers would be diminished.

The 14,600 acre-feet of additional storage capacity provided by the Cle Elum Pool Raise Project would help meet the State's Water Supply Facility Permit and Funding Milestone (see Section 1.8.2). If the Milestone is met, the Teanaway Community Forest would continue to be managed to meet the goals of the Integrated Plan, including habitat protection and restoration.

4.24 Cumulative Impacts

Cumulative impacts are the effects that may result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). This analysis looks at whether the impacts of the Cle Elum Pool Raise Project could add to impacts from other projects in the area. It briefly describes the cumulative impacts of past actions related to agricultural development in the Yakima River basin. However, this cumulative impacts analysis focuses on the past, present, and reasonably foreseeable projects that could have additive or interactive effects in combination with the Cle Elum Pool Raise Project. For this FEIS, the analysis generally includes the entire Yakima River basin.

4.24.1 Past Actions

The following sections summarize the cumulative impacts of past land use and water management practices in the Yakima River basin. The baseline condition described in Chapter 3, Affected Environment includes the changes to the environment caused by these past practices.

4.24.1.1 Land Use Practices

Agricultural development in the Yakima River basin over the past 150 years, including the Yakima Project, has caused impacts on surface water, water quality, fish, vegetation and wetlands, wildlife, and cultural resources (Sections 1.3 and 1.6 of the Integrated Plan PEIS [Reclamation and Ecology, 2012]). Timber harvest, mining, transportation, and residential and commercial development have further altered environmental conditions in the basin. Impacts from these past actions include altered stream channels and flows, increased erosion, degraded water quality, blocked fish passage, degraded riparian habitat, loss of forest and shrub-steppe habitat, and declines in fish and wildlife populations. The impacts that have degraded fish and wildlife habitat have led to listing of species such as the northern spotted owl, MCR steelhead, and bull trout as federally threatened or endangered species.

4.24.1.2 Water Management Practices

Past water management actions have caused cumulative impacts that have affected surface water, fish, vegetation, wildlife, and cultural resources in the Cle Elum Reservoir area.

Construction of crib dams and Cle Elum Dam blocked fish passage to glacial Lake Cle Elum and the upper Cle Elum River and inundated forest habitat and cultural resources. Water storage and releases from the dam altered streamflows in the river below the dam, which in turn altered the stream channel as well as riverine and floodplain ecosystems. These impacts have degraded fish and wildlife habitat and led to listing of species such as the northern spotted owl, MCR steelhead, and bull trout as federally threatened or endangered species. Residential, commercial, and recreational development have altered the reservoir shoreline and disturbed wildlife habitat. Cle Elum Dam created a reservoir larger than the historic lake and flooded forest areas. The reservoir also inundated traditional Native American hunting, fishing, and gathering areas that had been located on the historic lake shoreline. Cle Elum Dam, which has been determined as eligible for listing on the NRHP, has been modified over the years, which has altered the integrity of its historic status.

4.24.2 Present Actions

Reclamation and Ecology have characterized present actions as those that are currently ongoing within the Yakima River basin that could have additive or interactive effects in relation to the proposed action. Within or near the Cle Elum Reservoir area, two current, major activities could contribute to cumulative impacts in the reservoir area: construction activity along I-90 and expanded development at the Suncadia resort.

The Washington Department of Transportation (WSDOT) has been constructing a corridor improvement project along I-90 to reduce congestion and improve safety along a 15-mile corridor from Hyak to Easton. The project would stabilize slopes, replace deteriorating pavement, add capacity, and improve bridges and culverts. The intent of the project is to reduce road closures due to avalanches. Construction of Phase One, Hyak to Keechelus Dam, began in 2009 with scheduled completion in 2018. Construction activity along I-90 is outside of the area tributary to Cle Elum Reservoir, but would contribute increased traffic and associated noise, dust, and other traffic-related impacts. Construction activities have caused I-90 closures lasting at least 1 hour for rock blasting, lane closures in both directions, and rolling slowdowns that have caused traffic delays of up to 20 minutes. The impacts of increased construction traffic of the Cle Elum Pool Raise Project and the I-90 project would cause cumulative impacts on residents of the area and on travelers on I-90. Because construction-related traffic from the Cle Elum Pool Raise Project would be minor, no significant cumulative traffic impacts are anticipated.

Suncadia Master Plan Resort has planned to implement its Phase 2 expansion for several years, which could add as much as 100 additional acres of residential development. Suncadia is located downstream from Cle Elum Reservoir on the east side of the lower Cle Elum River. At this time, there is no firm date for implementation of the expansion, but it remains a viable development option. This expansion could increase demands on water resources; add to traffic, dust, and noise within the area; and reduce the amount of habitat available. Additive or interactive effects could occur, so Reclamation considered the proposed Suncadia expansion for this cumulative impact analysis.

The amount of overlap in the timing of construction at Suncadia and the Cle Elum Pool Raise Project is not known. Construction-related traffic impacts from the Cle Elum Pool Raise

Project are expected to be minor and spread over a 5-year construction period. Construction at Suncadia would also likely occur over a number of years. Therefore, cumulative construction-related traffic, noise and air quality impacts would be minor. Because Suncadia resort has its own water supply, the increased water demand from the expansion would not affect water supplies for the Yakima Project. The two projects would result in a cumulative loss of vegetation which could reduce wildlife habitat in the Cle Elum River watershed. Because Reclamation would mitigate for losses to vegetation, no significant cumulative impacts are anticipated.

4.24.3 Reasonably Foreseeable Future Actions

4.24.3.1 Projects Included in the Analysis

Reclamation and Ecology have used the following criteria to identify reasonably foreseeable projects for this cumulative impact analysis. The criteria are projects that:

- Occur within the defined boundary
- Have some level of design, planning, and are being actively pursued
- Have additive or interactive effects in relation to the proposed action.

Reasonably foreseeable future projects identified in the Cle Elum Reservoir area include two projects in the Integrated Plan Initial Development Phase—Kachess Drought Relief Pumping Plant Project (KDRPP) and Keechelus-to-Kachess Conveyance Project (KKC). Reclamation and Ecology are proposing to construct a pumping plant that would allow inactive storage to be withdrawn from Kachess Reservoir under KDRPP and a conveyance line to divert water from Keechelus Reservoir to Kachess Reservoir under KKC. KDRPP and KKC include bull trout enhancement to enhance the resiliency of bull trout populations in the Yakima River basin. Reclamation and Ecology prepared a DEIS, released in January 2015, on the projects to evaluate the potential impacts from the KKC and KDRPP Projects (Reclamation and Ecology, 2015).

The Initial Development Phase of the Integrated Plan is the period from the State's authorizing legislation for the Integrated Plan in 2013 through the year 2023. Projects included in the Initial Development Phase are those identified by Reclamation and Ecology that would quickly achieve tangible improvements in streamflow, habitat, and fish passage, as well as provide increased security of existing out-of-stream water supplies. KDRPP and KKC meet the criteria for inclusion as reasonably foreseeable projects for this cumulative impact analysis.

Reclamation and Ecology have included other projects in the Integrated Plan Initial Development Phase, but those projects, including water conservation and stream restoration projects, would occur outside the defined boundary for affected resources and would not have additive or interactive effects with the Cle Elum Pool Raise Project. Thus, Reclamation does not consider these projects part of this cumulative impact analysis because they do not meet the criteria. The No Action Alternative evaluated in this FEIS includes reconstruction of the interim fish passage facilities, construction of permanent fish passage facilities, ongoing fish reintroduction programs, and two YRBWEP Phase 2 conservation projects.

Impacts of these projects in combination with the Cle Elum Pool Raise Project were evaluated in Sections 4.2 through 4.22 of this FEIS.

The WSDOT I-90 improvements are both present (current phases described in Section 4.24.2) and reasonably foreseeable future actions. Phase Two of the project, from Keechelus Dam to the Cabin Creek Interchange, is scheduled from 2015 to 2020. A third phase, from Cabin Creek Interchange to the Easton vicinity, has currently been funded only for scoping and planning. WSDOT's future plans for improvements to the I-90 corridor through the Cascades include highway improvements for a 2.1 mile section (milepost 59.9 to 62.0) near Snoqualmie Pass, known as the I-90 – Snoqualmie Pass East Phase 2A project. Construction associated with this project is outside the immediate Cle Elum Reservoir area, but construction vehicles accessing the reservoir would use I-90. Additive or interactive effects could occur, so Reclamation considers future I-90 construction as part of this cumulative impact analysis.

Utility companies have filed applications with the Federal Energy Regulatory Commission to study or develop hydropower at Cle Elum Dam in the past. Since there are no current applications, Reclamation does not consider future hydropower development at Cle Elum Dam a reasonably foreseeable future project. Reclamation has not identified other reasonably foreseeable projects for the Cle Elum Pool Raise Project.

4.24.3.2 Potential Cumulative Impacts of Reasonably Foreseeable Projects

The following subsections describe the potential cumulative impacts of the identified reasonably foreseeable projects on each resource evaluated in this FEIS. The analysis area for evaluating cumulative impacts is the area surrounding Cle Elum Reservoir and the overall Yakima River basin.

The Cle Elum Pool Raise Project would provide additional storage capacity to improve instream flows downstream from the dam or to increase TWSA for proratable irrigation districts. Reclamation and Ecology have identified Alternative 3, which would use the additional storage capacity for instream flows, as the Preferred Alternative. Under the Preferred Alternative, the project would contribute incrementally to cumulative improvements to aquatic resources in the Yakima River basin.

Construction Impacts. The Cle Elum Pool Raise Project would cause construction-related impacts that would contribute to overall construction-related traffic, noise, and dust in the vicinity. This could result in impacts on noise-sensitive wildlife in the area; however, Reclamation does not expect the cumulative impacts to be significant. Construction vehicles for the Cle Elum Project would add to overall construction-related traffic delays; however, increased traffic on I-90 from the Cle Elum Pool Raise Project construction would be minor, so Reclamation does not anticipate significant cumulative impacts

Access to the three reservoirs is from I-90, so construction traffic on the roadway would increase if construction of all three projects occurred at the same time. Construction traffic on I-90 associated with the Cle Elum Pool Raise Project would be minor, so Reclamation anticipates no significant cumulative impacts on I-90. Because construction access from I-90 to the three project areas would be on different local roadways and construction traffic for the Cle Elum Pool Raise Project would be minor, Reclamation anticipates no significant cumulative impacts on local roadways.

Surface Water. The Cle Elum Pool Raise Project would increase the shoreline area inundated by the reservoir for short periods, which would add cumulatively to the amount of land inundated by reservoirs in the Yakima River basin. The increased inundation would not be significant because it would be short-term and limited in scale. Use of the additional storage capacity to improve instream flows downstream from the dam under Alternatives 2 and 3 would have positive impacts on aquatic habitat in the Cle Elum and Yakima rivers. This improvement would help address past cumulative impacts on instream flows and habitat. Using the additional storage capacity for TWSA under Alternatives 4 and 5 would have positive impacts on water supply to proratable irrigation districts, but would not benefit aquatic habitat.

KDRPP would significantly increase water supplies to proratable irrigation districts during drought years. In combination with using the additional storage capacity from the Cle Elum Pool Raise Project for TWSA, the improvements to irrigation supply would add cumulatively to the benefits of KDRPP. KKC would reduce the artificially high flows in the reach of the Yakima River downstream from Keechelus Dam, significantly improving habitat for salmonids. The benefits of the Cle Elum Pool Raise project for salmonids combined with KKC would have positive cumulative impacts. The I-90 project would not affect instream flows or irrigation water supply, so no cumulative impacts would occur.

Earth. The Cle Elum Pool Raise Project would result in increased inundation of the reservoir shoreline, which would result in increased erosion. This increase would be additive to erosion that is currently occurring within the reservoir, but the incremental increase is expected to be minor. With Reclamation's proposed mitigation and ongoing shoreline inventory, these impacts are not expected to be significant. The project would not have cumulative impacts on earth.

Surface Water Quality. The Cle Elum Pool Raise Project would not cause significant impacts on water quality in the reservoir or in the Cle Elum and Yakima rivers downstream. No cumulative impacts on water quality are anticipated in combination with the reasonably foreseeable projects because water quality impacts would be confined to the immediate area of the projects.

Groundwater. No negative effects on water wells or groundwater levels are expected because temporary increases in groundwater levels from the increased reservoir level would not impair the function of wells or decrease the yield of the aquifer. The higher groundwater levels could negatively affect some on-site sewer systems, but Reclamation would mitigate for any such impacts and no cumulative impacts on groundwater are anticipated. KDRPP could lower the water level in wells adjacent to the reservoir; however, Reclamation would develop appropriate mitigation for any affected residences. No cumulative impacts on groundwater are anticipated in combination with the reasonably foreseeable projects because Reclamation would provide mitigation for project impacts.

Fish. The Cle Elum Pool Raise Project would have minor positive and negative impacts on fish in the reservoir. These impacts would be confined to the reservoir and would not cause cumulative impacts in combination with the other reasonable foreseeable projects. If the additional storage capacity were used for instream flows, the project would benefit salmonids in the Cle Elum and Yakima rivers. These benefits would add cumulatively to the benefits to fish of other reasonably foreseeable projects.

Vegetation. The Cle Elum Pool Raise Project is not expected to significantly impact wetlands or upland and riparian vegetation. Reclamation would fully mitigate for any impacts on wetlands and loss of vegetation. However, the project, in combination with the reasonably foreseeable projects, would contribute cumulatively to the loss of wetlands and native vegetation in the Yakima River basin.

Wildlife. Minor disturbance to wildlife would occur during construction of the Cle Elum Pool Raise Project and the project would cause minor losses of habitat in the shoreline area. These impacts, while not expected to be significant, contribute to an overall trend of reduced habitat within the region, and could exacerbate stresses on species using shoreline habitats. In combination with the minor impacts on wildlife from the KDRPP, KKC and I-90 projects, the Cle Elum Pool Raise Project would cumulatively impact wildlife in the Yakima River basin.

Threatened and Endangered Species. Reclamation expects the Cle Elum Pool Raise Project would have both minor negative and minor positive impacts for bull trout, MCR steelhead, and northern spotted owl, the only ESA-listed species potentially affected by the project. Higher reservoir levels would temporarily increase productivity, but could also increase turbidity. Reclamation expects changes in habitat functionality to be minor. The Cle Elum Pool Raise Project would improve habitat for bull trout and steelhead downstream from the reservoir if the additional storage capacity is used for instream flows. KKC would have positive impacts for bull trout and steelhead by reducing artificially high flows in the Yakima River downstream from Keechelus Reservoir. The Bull Trout Enhancement, included with both the KKC and KDRPP projects would improve habitat for bull trout. The reasonably foreseeable projects would add cumulatively to improvements in bull trout and steelhead habitat in the Yakima basin.

The increased pool elevation would impact northern spotted owl nesting, foraging, and roosting habitat and high quality dispersal habitat. Reclamation would mitigate for these impacts by restoring Federal lands on the west side of the reservoir. The restoration would enhance habitat and other natural functions as well as reduce fragmentation and create more contiguous forested habitat within designated critical habitat for northern spotted owl. KKC and KDRPP would have similar impacts on northern spotted owl and Reclamation would mitigate for those impacts, resulting in improved habitat for northern spotted owl in the upper Yakima River basin. The projects would have minor cumulative benefits for northern spotted owl.

Visual Quality. The increased reservoir level and modifications to Cle Elum Dam would have minor impacts on visual quality at Cle Elum Reservoir. KDRPP would have significant impacts on visual quality at Kachess Reservoir when the reservoir is drawn down during drought years. The reasonably foreseeable projects would add cumulatively to visual quality impacts at reservoirs in the Yakima River basin.

Air Quality. The proposed project would cause only minor, temporary impacts on air quality. Therefore, the project would not contribute cumulatively to air quality impacts in combination with the reasonably foreseeable projects.

Climate Change. The Cle Elum Pool Raise Project and the reasonably foreseeable projects would generate carbon emissions, but the combined level of those emissions would be below Ecology's significance level. Under predicted climate change conditions, the additional storage capacity would allow water managers more flexibility to respond to the adverse impacts of climate change on water supply and instream flow conditions. The KKC improvements to streamflow and salmonid habitat and the KDRPP improvements to water supply in drought years would increase Reclamation's flexibility to respond to climate change impacts. The Cle Elum Pool Raise Project and the reasonably foreseeable projects would add cumulatively to adaptability to climate change.

Noise and Vibration. The proposed project would cause minor increases in noise and vibration during construction and no long-term impacts. Therefore, the project would not contribute cumulatively to noise and vibration impacts in combination with the reasonably foreseeable projects.

Recreation. The Cle Elum Pool Raise Project would not cause long-term impacts on developed recreation at Cle Elum Reservoir because the project includes measures to protect recreation facilities from increased inundation. The project would affect dispersed recreation. The higher reservoir pool would inundate popular dispersed recreation areas at Dry, Morgan, and French Cabin creeks. Because the impacts on dispersed camping would be temporary, and other opportunities would be available throughout the camping season, impacts on dispersed camping would be negative, but not significant.

The additional reservoir drawdown associated with KDRPP would significantly impact recreation at Kachess Reservoir during drought years. The impacts would likely cause recreationists to avoid the area. The loss of recreation areas at Kachess Reservoir, in combination with the loss of dispersed camping at Cle Elum Reservoir, could cause recreationists to seek similar recreation opportunities at other reservoirs in the area. Recreation use at these reservoirs currently exceeds capacity during peak periods. The increased use and crowding from recreationists displaced from Kachess or Cle Elum reservoirs would be a cumulative impact on recreation in other reservoir areas.

Land and Shoreline Use. The Cle Elum Pool Raise Project would not cause impacts on land use. Therefore, the project would not contribute cumulatively to land use impacts in the Yakima River basin.

Utilities. No disruptions to utilities or increases in utility use would occur as a result of the Cle Elum Pool Raise Project. Therefore, the project would cause no cumulative impacts on utilities in the Yakima River basin.

Transportation. Other than minor traffic increases during construction, the Cle Elum Pool Raise Project would not cause transportation impacts. Therefore, no cumulative impacts on transportation would occur from the project.

Socioeconomics. Socioeconomic impacts associated with the proposed project would be positive, resulting in a gain in regional economic activity. The reasonably foreseeable projects would have similar positive impacts. The projects would contribute cumulatively to gains in regional economic activity in the Yakima River basin and Four County Region.

Cultural Resources. The Cle Elum Pool Raise Project would adversely impact cultural resources by changing the historic Cle Elum Dam and impacting cultural resources around the reservoir. These impacts would be in addition to impacts that have occurred in the past and would occur with the Cle Elum Dam Fish Passage Project. KKC would impact the historic Kachess Dam and KKC, KDRPP and the I-90 project all have the potential to disturb cultural resources during construction. These impacts would contribute cumulatively to impacts on cultural resources in the Yakima River basin. Reclamation does not expect these impacts to be significant with the implementation of appropriate mitigation. Reclamation is addressing cumulative impacts in the development of the CRMP described in section 4.19.8.

The Yakama Nation Cultural Resources Program, suggests in its study that Cle Elum Reservoir is part of a broader landscape that also includes Kachess and Keechelus reservoirs (Yakama Nation Cultural Resources Program, 2014). Therefore the reasonably foreseeable projects could add cumulatively to cultural resources impacts in the upper Yakima basin.

Indian Sacred Sites and Indian Trust Assets. No Indian sacred sites or ITAs have been identified in the project area to date; therefore, no impacts would occur. Reclamation will continue to consult with affected Tribes on these resources. If any Indian sacred sites are identified, Reclamation would protect and provide continued access to the sites. If any ITAs are identified, Reclamation would comply with its Indian Trust Assets Policy (July 2, 1993) that states impacts on ITAs would be avoided whenever possible.

Environmental Justice. The Cle Elum Pool Raise Project would not disproportionately affect minority or low-income populations. Therefore, no cumulative impacts on environmental justice would occur.

4.25 Unavoidable Adverse Impacts

Unavoidable adverse impacts are defined as environmental consequences of an action that cannot be avoided, either by changing the nature of the action or through mitigation if the action were undertaken. The proposed project design features, BMPs, and compensatory mitigation would avoid or minimize many of the potential adverse effects associated with the proposed alternatives. However, it would not be possible to avoid all adverse effects, nor would mitigation be 100 percent effective in remediating all impacts. There would be a minimal amount of unavoidable impact on most resources in the Cle Elum Reservoir area for at least a short time, due to the presence of equipment and humans in the area and the time necessary for restoration to be effective.

Unavoidable adverse impacts associated with the Cle Elum Pool Raise Project include the following:

- Increased inundation of approximately 46 acres of land around the reservoir for about 40 days
- Increased erosion along approximately 8,300 feet of unprotected shoreline during higher water levels
- Permanent loss of 2 to 5 acres of shoreline vegetation
- Temporary loss of vegetation associated with access roads and staging areas
- Inundation of vegetation communities, including wetlands
- Inundation of areas of dispersed recreation, potentially causing expansion into undisturbed areas
- Temporary disruptions to recreational use and private properties during construction
- Property or easement acquisition to install shoreline protection
- Permanent impacts on the historic features of Cle Elum Dam, constituting an "Adverse Effect"
- Adverse impacts on at least one eligible archaeological site associated with increased inundation levels

4.26 Relationship between Short-Term Uses and Long-Term Productivity

NEPA requires considering "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). This occurs when an agency counterbalances short-term negative effects by a long-term positive effect (and vice-versa). As identified above, the Cle Elum Pool Raise Project would cause minor short- and long-term impacts on some resources. Benefits to instream flows, fish, and threatened and endangered species would counterbalance these impacts.

4.27 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments are decisions affecting resources, such as wetlands and vegetation, where the resource is lost and replacement can only occur over a long period of time, or at great expense, or cannot be replaced at all (for example, minerals). Irretrievable commitments refer to loss of production or use of resources because of a decision, such as removal of trees, which eliminates another harvest until a new stand grows. They represent opportunities foregone for the period of time that a resource is not useable.

While there would be some temporary and permanent removal of vegetation with this project, overall the irreversible and irretrievable resources associated with that removal are minor relative to the amount of resources available in the basin. There would be an irreversible and irretrievable commitment of the energy used during the manufacture and mining of proposed project components and materials as well as during construction and operation of the project. Under all action alternatives, the physical alteration of Cle Elum Dam would have an irreversible effect on the historic integrity of that structure. Each action alternative would also have an irreversible effect on at least one identified archaeological site along the shoreline of Cle Elum Reservoir.

4.28 Energy and Depletable Resources

NEPA requires consideration of energy requirements and conservation potential for each EIS alternative (40 CFR 1502.16(e) and Executive Order 13514).

The action alternatives would require expenditures of energy, including natural and depletable resources, during construction of the spillway gate modifications and shoreline protection measures; however, the energy use would be short-term and have negligible impacts on energy resources. Each alternative would have similar energy expenditures and impacts.

The Cle Elum Pool Raise Project and its alternatives do not require additional energy for long-term operation.

4.29 Environmental Commitments

Environmental commitments are measures or practices adopted by a project proponent to reduce or avoid adverse effects that could result from project operations. Specific mitigation measures for project impacts are described for each resource elsewhere in Chapter 4 which include the environmental commitments from the Integrated Plan Record of Decisions (Reclamation, 2013). This section summarizes major environmental commitments for the Cle Elum Pool Raise Project. Reclamation and Ecology share the responsibility to ensure obligations to protect natural resources are fulfilled.

Reclamation will develop an environmental inspection and mitigation monitoring program to ensure that all environmental commitments can be met. Reclamation will coordinate development and implementation of this program with the USFS, Ecology, WDFW, WDNR, the Service, NMFS, and other State and Federal agencies, as appropriate. Reclamation will conduct environmental review and compliance on this program when it is developed.

In addition, Reclamation will implement the following measures:

- Construct all shoreline protection measures in the dry when the reservoir is drawn down to avoid in-water work
- Complete all planned shoreline protection measures prior to raising the level of the reservoir
- Continue the existing shoreline inventory to identify erosion problems and appropriate control measures
- Obtain all applicable Federal, State and local permits

- Implement mitigation measures required by the Service and NMFS through ESA consultation
- Implement conservation measures required by the Service in its Conservation Act Report
- Develop an environmental inspection and mitigation monitoring program to ensure that all environmental commitments can be met.
- Coordinate with Ecology's water quality staff to ensure compliance with the State antidegradation policy
- Take measures, in coordination with the USFS, to mitigate for impacts caused by existing dispersed camping, day use, and unauthorized motor vehicle access near the north end of the reservoir
- Prior to construction, conduct cultural resource studies of all areas that would be disturbed by construction
- For all cultural resources directly impacted by the project, implement mitigation measures and treatment plans as described in Section 4.19.8 and as required through further Section 106 consultation with the SHPO, Yakama Nation, Colville Confederated Tribes, and USFS
- Develop a Cultural Resource Management Plan to address ongoing and future operational and land management implications of the proposed project
- Prior to construction, conduct wetland surveys using current wetland delineation methodology. Design projects to avoid wetland impacts. If wetland impacts occur, comply with mitigation measures established in permit conditions to ensure no net loss
- Coordinate with the Corps and State and local agencies to develop appropriate methodologies to determine whether the proposed additional inundation would result in a loss of wetlands that requires permit approval. Develop and implement mitigation measures, if necessary, to meet agency permit conditions for any wetland impacts caused by increased inundation
- Prior to construction, coordinate with USFS to determine the presence of any Sensitive or Survey and Manage species and take steps to minimize impacts on those species
- Prior to construction, coordinate with WDFW to determine the presence of State-listed species and Priority Habitat and Species and take steps to minimize impacts on those species
- Prior to construction, survey utilities in construction areas and take appropriate measures to minimize conflicts with any identified utilities
- Prior to raising the pool level, identify any potentially affected OSS to establish baseline conditions and develop mitigation strategies for any OSS that would become noncompliant as a result of the increased reservoir pool

Reclamation will implement current BMPs when appropriate, to enhance resource protection and avoid additional potential affects to surface and groundwater quality, earth resources, fish, wildlife, and their habitats:

- Haul oils and chemicals to an approved site for disposal and use vegetable–based lubricants for machinery when working in or near water to prevent petroleum products from entering surface or groundwater
- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP) per Ecology’s rules and regulations. The plan will include erosion control methods, stockpiling, site containment, shoreline protection methods, equipment storage, fueling, maintenance, and washing, as well as methods to secure a construction site under circumstances of an unexpected high water or rain event
- Equip all construction equipment with environmental spill kits to contain petroleum products in the event of a leak
- Require all contractors to have a Spill Prevention Plan and a Toxics Containment and Storage Plan
- Develop a spill plan to implement containment of construction materials such as treated woods, contaminated soils, concrete, concrete leachate, grout, and other substances that may be deleterious or toxic to fish and other aquatic organisms
- Develop a plan for safe handling and storage of potentially toxic construction materials, fuels, and solvents for staging sites in close proximity to receiving waters and riparian areas
- Strategically place stockpiles of earthen materials to minimize runoff into nearby receiving waters
- Require all contractors to inventory noxious weed populations by marking with temporary fencing to avoid spreading weeds to other areas in accordance with local, State, and Federal weed control requirements
- Continue with ongoing weed control efforts on disturbed lands following construction and revegetation in accordance with Federal, State and local regulations

Chapter 5

PUBLIC INVOLVEMENT, CONSULTATION, AND COORDINATION

CHAPTER 5.0 PUBLIC INVOLVEMENT, CONSULTATION, AND COORDINATION

This chapter describes the public involvement, consultation, and coordination activities undertaken by Reclamation and Ecology to date, plus future actions that will occur as this project moves forward. Public information activities will continue as this project is further developed and implemented.

5.1 Public Involvement

Public involvement is a process in which agencies consult with and include in the decisionmaking process interested and affected individuals, organizations, agencies, and governmental entities. In addition to providing information to the public regarding this EIS, Reclamation and Ecology solicited responses regarding the public's needs, values, and evaluations of the proposed alternatives. Both formal input and informal input were encouraged and used.

5.1.1 Scoping Process

Reclamation and Ecology sought comments from the interested public, including individuals, organizations, and governmental agencies. The process of seeking comments and public information for an EIS is called "scoping." Scoping is an early and open process to determine the scope of issues for an EIS and to identify the significant issues related to a proposal.

On October 30, 2013, Reclamation published a Notice of Intent to prepare an EIS in the Federal Register. Reclamation and Ecology issued a joint press release to Washington State media on November 6, 2013, announcing the dates and locations of scoping meetings and requesting comments. Reclamation mailed meeting notices to interested individuals, Tribes, interest groups, and governmental agencies. In addition, Reclamation posted the notice on its Integrated Plan website and associated pages, describing the project, requesting comments, and providing information about the public scoping meetings.

On November 4, 2013, Ecology published its SEPA Determination of Significance and public notices in area newspapers, requesting comments on the scope of the EIS. Ecology also notified by email all those registered on its Yakima Integrated Plan list-serve and posted the notice on its Office of Columbia River website.

On November 20, 2013, Reclamation and Ecology held two public scoping meetings at the Yakima Arboretum in Yakima, Washington—one in the afternoon and one in the evening. A combined total of 23 individuals attended. At the meetings, Reclamation described the Cle Elum Pool Raise Project proposal and gave attendees the opportunity to discuss the proposal with Reclamation and Ecology staff as well as comment on the scope of the EIS, the EIS process, and resources the pending EIS would evaluate.

On November 21, 2013, Reclamation and Ecology held two public scoping meetings at the USFS headquarters in Cle Elum, Washington—one in the afternoon and one in the evening. A combined total of 33 individuals attended. The meeting format followed that of the Yakima meetings.

5.1.1.1 Comments Received from the Public

The scoping comment period began October 30, 2013, and concluded December 16, 2013. The agencies received 17 comment documents and telephone calls covering a wide range of topics. The comments assisted Reclamation and Ecology to:

- Identify the significant issues relevant to the proposal
- Identify those elements of the environment that could be affected by the proposal
- Formulate alternatives for the proposed action

The following major concerns were reflected in the comments:

- Surface water and use of the additional 14,600 acre-feet of water
- Impacts on fish, vegetation, wetlands, wildlife, threatened and endangered species, and recreation
- Impacts on land use, transportation, and socioeconomics
- Cumulative effects

The comments are summarized in a Scoping Summary Report (Reclamation and Ecology, 2014a) available from Reclamation upon request. It is also available online at the websites for Cle Elum Pool Raise Project (http://www.usbr.gov/pn/programs/eis/cleelumraise/index.html) and the Yakima River Basin Water Enhancement Project (YRBWEP) Integrated Plan website (http://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html).

5.1.2 Comments on the Draft EIS

Reclamation and Ecology released the Draft Environmental Impact Statement (DEIS) on September 23, 2014. A Notice of Availability and Public Hearings appeared in the Federal Register on September 23, 2014. Reclamation distributed a press release announcing the availability of the DEIS and the date, time, and location of the public meetings to area media. Ecology published a Notice of Availability in area newspapers. The 60-day public comment period ended November 25, 2014.

Reclamation and Ecology distributed a total of 329 copies of the DEIS to Federal, State and local agencies; Native American Tribes; irrigation districts; interested members of organizations and entities; and the general public. The DEIS and supporting materials were also available online at Reclamation's website.

During the DEIS public comment period, Reclamation and Ecology received 21 comment letters on the DEIS with 286 individual comments. One letter was from a Tribe, three were from Federal agencies, two were from State agencies, one was from an irrigation district, seven were from organizations, and the rest were from individuals. The comment letters are included in the Comment and Responses section of this FEIS.

Reclamation and Ecology held two public meetings. The first meeting was held on October 21 in Ellensburg, Washington, with eight members of the public in attendance. The second meeting was held on October 22 in Cle Elum, Washington, with 13 members of the public in attendance. No comments were provided to the court reporter at either meeting.

5.2 Consultation and Coordination

The Council on Environmental Quality regulations (40 CFR 1501.6) emphasize agency cooperation early in the NEPA process and allow a lead agency (in this instance, Reclamation) to request the assistance of other agencies that either have jurisdiction by law or have special expertise regarding issues considered in an EIS. Reclamation requested that the BPA, NMFS, USFS, Service, and the Yakama Nation participate as cooperating agencies in the Cle Elum Pool Raise Project EIS. The BPA and Yakama Nation both responded that they would participate as cooperating agencies due to their special expertise regarding issues considered in the EIS. NMFS and USFS also responded that they would participate as cooperating agencies based on their jurisdictional responsibilities under the ESA and National Forest Management Act, respectively, as well as their special expertise regarding issues considered in the EIS. The Service requested that its participation in the EIS be through the Fish and Wildlife Coordination Act instead of acting as a cooperating agency (see Section 5.4.2). Reclamation agreed to the Service's request.

5.3 Tribal Consultation and Coordination

Reclamation and Ecology have determined that the project area lies within the ceded territory of the Yakama Nation and the CTUIR. Reclamation is also consulting with the Colville Confederated Tribes as part of the NHPA process. The Yakama Nation is a major partner in the overall Integrated Plan and has been involved in all aspects of it, including the Cle Elum Pool Raise Project. Additionally, the Yakama Nation is conducting cultural resource surveys to assist Reclamation and Ecology with compliance activities associated with the NHPA and Washington State preservation laws.

Reclamation sent a letter on July 24, 2014, requesting Government-to-Government consultation with the CTUIR. Reclamation sent the DEIS to the Tribe and will schedule meetings to discuss the project with the CTUIR and send copies of the FEIS to the Tribe.

5.3.1 Native American Graves Protection and Repatriation Act

The 1990 Native American Graves Protection and Repatriation Act (NAGPRA) regulates Tribal consultation procedures in the event of inadvertent discoveries of Native American graves and other NAGPRA "cultural items." NAGPRA requires that agencies receiving Federal funds consult with Tribes during Federal project planning if graves and other NAGPRA cultural items are discovered. NAGPRA details procedures for repatriation of human skeletal remains and other cultural items to appropriate Tribes. Reclamation will comply with NAGPRA regulations (43 CFR Part 10) if any graves or other NAGPRA cultural items are discovered.

5.3.2 Executive Order 13175: Consultation and Coordination with Tribal Governments

Executive Order 13175 instructs Federal agencies to consult, to the greatest extent practicable and to the extent permitted by law, with Tribal governments prior to taking actions that affect federally recognized Tribes. Each agency assesses the impact of Federal Government plans, projects, programs, and activities on Tribal trust resources and assures consideration of Tribal government rights and concerns during the development of such plans, projects, programs, and activities. As described in Section 5.3, Reclamation has consulted with the Yakama Nation, Colville Confederated Tribes, and the CTUIR. This FEIS evaluated potential impacts on cultural resources (Section 4.19), Indian sacred sites (Section 4.20), and Indian Trust Assets (Section 4.21).

5.3.3 Executive Order 13007: Indian Sacred Sites

Executive Order 13007 (May 24, 1996) instructs Federal agencies to promote accommodation of access to and protect the physical integrity of American Indian sacred sites. A "sacred site" is a specific, discrete, and narrowly delineated location on Federal land. An Indian Tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. However, the EO includes the proviso that the Tribe or authoritative representative has informed the agency of the existence of such a site. As described in Section 4.20 Reclamation has determined the project would not impact Indian sacred sites because the Tribes have not identified any in the project area. Reclamation will continue to coordinate with affected Tribes and, if the agency identifies any Indian sacred sites in the future, it will consult with affected Tribes to determine how to protect them.

5.3.4 Secretarial Order 3175: Department Responsibilities for Indian Trust Assets

ITAs are legal interests in property held in trust by the United States for federally recognized Indian Tribes or individual Indians. ITAs may include land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, and instream flows associated with trust land. The United States allotted some Tribes land under the General Allotment Act of 1887, and allotted others land through treaty or specific legislation until 1934, when Congress prohibited further allotments. These allotments are ITAs.

Federally recognized Indian Tribes with trust land are beneficiaries of the Indian trust relationship. The United States acts as trustee. By definition, no one can sell, lease, or otherwise encumber ITAs without approval of the U.S. Government.

Reclamation contacted the BIA, Yakima Office, to identify the presence of ITAs or trust land (allotments) in the project area. BIA personnel indicated that there are no allotments in the Cle Elum Reservoir area. Reclamation also contacted personnel at the BIA Colville Tribal Office, which also indicated that there is no trust land in the project area (Wolf, 2014).

Reclamation has determined that the project area does not include land held in trust by the United States for Tribes or individual allottees, nor does the project area include trust land or allotments. However, in the past, some Tribes have stated that habitat for fishing, hunting, and gathering located on federally owned land may constitute an ITA. While this is not Reclamation's position, the Government respects and acknowledges this Tribal perspective.

5.4 Compliance with Federal and State Laws and Executive Orders

In addition to the agency and Tribal coordination and consultation laws, Executive orders, and regulations described above, Reclamation will comply with the following laws and Executive orders on the Cle Elum Pool Raise Project.

5.4.1 Endangered Species Act

The ESA requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of ESA-listed species, or destroy or adversely modify their critical habitat. As part of the ESA's Section 7 process, an agency must request a list of species from the Service and NMFS that identifies threatened and endangered species within or near the action area. The agency then must evaluate impacts to those species. If the action may impact any ESA-listed species, the agency must consult with the Service, NMFS, or both. Reclamation is initiating ESA consultation with the Service and NMFS and will submit Biological Assessments to the agencies. Consultation will be complete before Reclamation signs of Record of Decision on the Cle Elum Pool Raise Project.

Reclamation has reviewed lists of ESA species provided by the Service and NMFS as described in Sections 3.9 and 4.9. Reclamation has begun discussions with the Service and NMFS on Section 7 consultation and will complete consultation prior to issuing the Record of Decision.

5.4.2 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) provides for equal consideration of wildlife conservation in coordination with other features of programs on water resource development. The FWCA requires that any plans to impound, divert, control, or modify any stream or other body of water must be coordinated with the Service and State wildlife agency through consultation directed toward prevention of fish and wildlife losses and development or enhancement of these resources.

Reclamation consulted with the Service regarding the Integrated Plan. The Service completed the Final Fish and Wildlife Coordination Act Report for the Integrated Plan in February 2012; and Reclamation posted it on the Yakima River Basin Integrated Water

Resource Management Plan website at:
http://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html.

When it initiated the NEPA process for the Cle Elum Pool Raise Project, Reclamation consulted with the Service regarding the need for further FWCA consultation. The Service replied that the FWCA consultation for the Integrated Plan had adequately considered the Cle Elum Pool Raise Project and stated that no further consultation was needed. Appendix F includes the letter from the Service. Reclamation will comply with the conditions of the Integrated Plan FWCA Coordination Act Report as it implements the project.

5.4.3 National Historic Preservation Act

The NHPA requires that Federal agencies consider the effects of their projects on properties eligible for or listed on the National Register of Historic Places (NRHP). Regulations in 36 CFR 800 provide procedures that Federal agencies must follow to comply with the NHPA. For any undertaking, Federal agencies must determine if there are properties of National Register quality in the project area, the effects of the project on those properties, and the appropriate mitigation for adverse effects. In making these determinations, Federal agencies are required to consult with the State Historic Preservation Office (SHPO), Native American Tribes with a traditional or culturally-significant religious interest in the study area, the interested public, and the Advisory Council on Historic Preservation (in certain cases).

Reclamation is conducting cultural resource compliance for the Cle Elum Pool Raise Project concurrently with NEPA in accordance with 36 CFR Part 800.8 (see Section 3.19.1). Reclamation's compliance with these regulations includes meeting its public involvement requirements under NHPA.

As a result of studies conducted by Reclamation and the Yakama Nation Cultural Resources Program, Reclamation has determined that the Cle Elum Pool Raise Project has Adverse Effects on historic and cultural properties. Cle Elum Dam is eligible for inclusion to the Register and modification of the radial spillway gates constitutes an Adverse Effect to the character-defining features of the dam. The project would also impact at least one identified archaeological site (Section 4.19). Reclamation has initiated consultation with the SHPO and with Native American Tribes (Section 5.3). The SHPO concurred with these determinations in letters included in Appendix G. Reclamation will continue consultation regarding impacts to historic and cultural resources and will develop and implement a treatment plan and a Cultural Resources Management Plan to define appropriate impact avoidance and mitigation.

5.4.4 Clean Water Act

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill materials into waters of the United States, including wetlands. The U.S. Army Corps of Engineers (Corps) evaluates applications for Section 404 permits. Permit review and issuance encourages, in sequence, avoidance of impacts, minimization of impacts, and, finally, mitigation for unavoidable impacts to the aquatic environment. The guidelines at Section 404(b)(1) of the CWA describe this sequence.

Section 4.4 of this FEIS describes potential impacts to water quality. Reclamation will implement best management practices and other techniques to minimize the potential for erosion and sedimentation during construction, the most likely impact to water quality. Reclamation will consult with the Corps regarding impacts to water quality and will comply with permit conditions.

As described in Section 4.7 of this FEIS, Reclamation will undertake wetland surveys of all construction areas prior to construction. Reclamation will design shoreline protection measures to avoid or minimize impacts to wetlands and will locate construction staging areas, roads, and other facilities outside wetlands to the extent possible. If wetland impacts are unavoidable, Reclamation will consult with the Corps and will comply with mitigation measures established by permit conditions.

5.4.5 Executive Order 11990: Protection of Wetlands

Executive Order 11990 (May 24, 1977) directs Federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial value of wetlands in carrying out programs affecting land use. Reclamation’s actions to comply with the CWA, described in Section 5.4.4, meet the requirements of this Executive Order.

5.4.6 Executive Order 12898: Environmental Justice

Executive Order 12898 (February 11, 1994) instructs Federal agencies, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of its mission by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. "Environmental justice" means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. "Fair treatment" implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs. As described in Section 4.22 of this FEIS, Reclamation does not expect the project to impact environmental justice populations.

5.4.7 Executive Order 11988: Floodplain Management

Executive Order 11988 (May 24, 1977) instructs Federal agencies to determine, to the greatest extent practicable, whether the Proposed Action will occur in a floodplain prior to taking an action and, if so, to consider alternatives to avoid adverse effects. If the only feasible alternatives occur within a floodplain, the agency shall take action to design or modify its action to minimize potential harm to or within the floodplain consistent with regulations accompanying this Executive order.

The shoreline of Cle Elum Reservoir and the Cle Elum River both upstream and downstream from the reservoir are within the mapped 100-year floodplain. Reclamation proposes to construct shoreline protection in some of the mapped floodplain areas on the reservoir shoreline. The intent of shoreline protection is to address potential erosion and inundation problems caused by the higher reservoir pool level. Reclamation also will design the shoreline protection to minimize potential harm to the floodplain. The proposed project will not cause additional flooding downstream because Reclamation will continue its flood control operations and release the additional flows from the reservoir during low-flow periods in the Cle Elum River.

COMMENTS AND RESPONSES

COMMENTS AND RESPONSES

The Draft Environmental Impact Statement (DEIS) for the Cle Elum Pool Raise Project was released to the public on September 23, 2014 when Reclamation published an announcement in the Federal Register that the DEIS was available for review and when Ecology filed the DEIS with the State Environmental Policy Act (SEPA) Register. Reclamation distributed a press release announcing the availability of the DEIS and the date, time, and location of the public meetings to area media. Ecology published a Notice of Availability in area newspapers. The 60-day public comment period ended November 25, 2014.

Reclamation and Ecology distributed a total of 329 copies of the DEIS to Federal, State and local agencies; Native American Tribes; irrigation districts; interested members of organizations and entities; and the general public. The DEIS and supporting materials were also available online at Reclamation's website.

During the DEIS public comment period, Reclamation and Ecology received 21 comment letters on the DEIS with 286 individual comments. One letter was from a Tribe, three were from Federal agencies, two were from State agencies, one was from an irrigation district, seven were from organizations, and the rest were from individuals. The comment letters are included in the Comment and Responses section of this FEIS.

Reclamation and Ecology held two public meetings. The first meeting was held on October 21 in Ellensburg, Washington, with eight members of the public in attendance. The second meeting was held on October 22 in Cle Elum, Washington, with 13 members of the public in attendance. No comments were provided to the court reporter at either meeting.

The following table provides a list of those who commented on the DEIS, the number of the comment letter, and the page number where the comment letter and the responses appear.

Table CR-1 List of those commenting

Letter Number	Commenter	Page Number	
		Comment Letter	Response
Tribes			
1	Confederated Tribes and Bands of the Yakama Nation	CR-5	CR-45
Federal Agencies			
2	Environmental Protection Agency	CR-6	CR-45
3	National Marine Fisheries Service	CR-9	CR-47
4	U.S. Fish and Wildlife Service	CR-15	CR-51
State Agencies			
5	Washington Department of Fish and Wildlife	CR-18	CR-52
6	Washington State Department of Transportation	CR-22	CR-54

Comment Letters

Confederated Tribes and Bands of the Yakama Nation
Established by the Treaty of June 9, 1855

Post Office Box 151
Toppenish Washington 98948

Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, Washington 98901

November 25th, 2014

Subject: Draft Environmental Impact Statement, Cle Elum Pool Raise

Dear Ms. McKinley:

This document contains staff level comments on the Draft Environmental Impact Statement for the Cle Elum Pool Raise from the Yakama Nation Department of Natural Resources.

<u>Comments on Use of Additional Stored Water</u>

We understand that Reclamation felt necessary to include an alternative that would use the additional stored water for TWSA, a purpose for which the pool raise is not authorized by Congress. Rather, the authorization makes it crystal clear that the additional supply is not to be used for out of stream water supply, but is exclusively for fisheries purposes. The use of the 14,600 acre feet of additional storage is a promise made to the Yakama Nation by Congress 20 years ago, a promise that should be kept.

1-1 Title XII, which authorizes the Cle Elum Pool Raise, was a package of measures that was supported by both irrigators and the Yakama Nation because of the benefits to both promised in the legislation. While the promises to irrigators have generally been met, the Yakama Nation has waited until this moment to realize the benefits of both anadromous fish passage and additional water supply to support those fish runs. A change in purpose of use of the Cle Elum Pool Raise water is not part of the Integrated Plan and has not been endorsed by the Work Group, the Implementation Committee, the Yakama Nation, or the U.S. Congress.

The current package that has been developed for Phase 1 of the Integrated Plan delivers benefits to proratable irrigators through the "K" projects along with conservation and other measures and delivers fisheries benefits through fish passage and additional storage at Cle Elum along with other habitat related projects. We believe that this Phase 1 package has consensus support among the IP Implementation Committee. A contrary proposal to shift the benefits of the Pool Raise away from the exclusive fisheries use Congress directed two decades ago would likely encounter strong opposition from several participants in the planning and development of the IP.

1-1 We therefore strongly suggest that Reclamation and Ecology select a preferred alternative that preserves the commitment by Congress and the President to dedicate the additional storage to the fishery along with the most ecologically appropriate measures to protect against shoreline erosion.

1-2 In the Tables on pages ES-xv and 4-2, both the existing Cle Elum River flow regime and the effects of the pool raise are inaccurately or incompletely described. First, 180 cfs is not accurately described as a minimum flow for the Cle Elum River. Winter flows are not frequently in the vicinity of 180 cfs. Without going into great detail, that flow is set through a process involving SOAC and others to maintain fish life. The additional 14,600 acre feet of storage is in addition to those flows and would be managed per the congressional authorization in a manner deemed most beneficial by SOAC. The "Winter Flows Scenario" described on p. 4-6 would not likely be the choice of the fish managers. Flows to maintain fish and other aquatic life in the reach below the dam are already required to be maintained without the additional storage.

1-3 The "Carry Over for Fish Passage Scenario" is more likely, but is incompletely and somewhat inaccurately described. The engineering decision about the elevation of the fish passage facility has already been made by Reclamation, so it is not accurate to suggest a future cost savings based on the three-foot rise. A better description of the carry over option is that by carrying over the additional storage through the winter, the reservoir stage would reach the lowest fish passage intake earlier than without the additional storage, with earlier beginning of outmigration contributing directly to survival. The earlier inception of fish passage is a calculable relationship based on reservoir stage/volume relationships along with the 2180 foot elevation of the fish passage facility, and the Final EIS should include an estimate of that benefit.

1-4 The suggestion that the pool raise will result in lower spring flows in the Cle Elum River (e.g. the table on ES-xv) is not a foregone conclusion. In a year when it is clear from snowpack and reservoir levels that the reservoir, including the additional 14.600 acre feet will refill and that the 2108 foot elevation of fish passage inception will be reached by the target date, the 14,600 acre feet carried over from the previous year could be released at a time determined optimal by the fish managers. The Final EIS should flesh out this concept.

1-5 In summary, Reclamation and Ecology should select a preferred alternative that meets the longstanding commitments of the United States Government to the Yakama Nation to provide viable fish passage and additional fishery-dedicated water supply.

Thank you for the opportunity to comment on this important project.

Sincerely,

Phil Rigdon
Yakama Nation Department of Natural Resources

Comment Letter 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS,
TRIBAL AND PUBLIC
AFFAIRS

November 25, 2014

Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, Washington 98901-2058

Re: Comments on the Draft EIS for the proposed Cle Elum Pool Raise Project (EPA Project Number: 13-0037-BOR).

Dear Ms. McKinley:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA) and the Council on Environmental Quality regulations for implementing NEPA, the U.S. Environmental Protection Agency (the EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the proposed **Cle Elum Pool Raise** in Kittitas County, Washington.

2-1 The DEIS evaluates potential environmental impacts associated with activities to raise the existing Cle Elum Reservoir level three feet to provide 14,600 acre-feet of additional water storage capacity needed to improve instream flows or to supplement the Total Water Supply Available (TWSA). Project activities would include modifying existing reservoir spillway radial gates to raise the pool elevation by 3 ft.; raising existing earthen saddle dikes and the height of the right abutment of the dam to provide adequate freeboard; and protecting the reservoir shoreline from erosion caused by increased water level and other impacts. In some areas, such shoreline protection would require land acquisition or easements from private landowners and new temporary shoreline access roads. The DEIS tiers to the Yakima River Basin Integrated Water Resource Management Plan/EIS.

Analysis of impacts from the proposed project considered five action alternatives (1-5), including a No Action (Alternative 1). The primary distinguishing features between action alternatives involve intended use of additional stored water; instream flows under alternative 2-3 or TWSA under alternative 4-5 and shoreline protection method; rock (riprap with some plantings) under alternative 2 and 4; or a hybrid (a range of treatments, including rock riprap and various bioengineered techniques) under alternatives 3 and 5 (p. 2-3). The DEIS does not identify a preferred alternative.

2-2 The EPA supports Reclamation's efforts to increase the capacity of the reservoir and improve aquatic resources for fish habitat, rearing, and migration in the Cle Elum and upper Yakima Rivers. We also appreciate the fact that the DEIS addresses many of the issues we raised during the project scoping period in November 2013, including analysis of cumulative and climate change effects. Also, we note that Reclamation engaged other resource management agencies and tribes in this project analysis. The DEIS includes a good description of resources within the project area, analysis of anticipated environmental impacts, measures to offset the impacts, and an adaptive strategy to adjust use of additional stored water with changed conditions and new information, as well as in consultation with the System Operations Advisory Committee (SOAC), established to help protect fishery resources from impacts due to the Yakima Project operations. Of the two shoreline protection approaches proposed, we would support the hybrid strategy because we believe that such an approach would effectively deal with the different shoreline sites and affected resources, as it would tailor treatments to each topographic site as needed.

2-3 We do have some concerns about the project's potential impacts to water quality, wetlands, riparian areas, and habitat as discussed in our attached detailed comments. We recommend continued work with Washington State Department of Ecology and affected Tribes to assure wise use and protection of water resources in the analysis area as the project is implemented. To protect fish in the reservoir and other streams in the project area, including species that are listed as endangered and threatened, we recommend continued coordination with the U.S. Fish and Wildlife Service and National Marine Fisheries Service as well as Washington State Department of Fish and Wildlife to define water management practices that would be protective of fisheries within waterbodies in the project area, especially those that are water-quality limited.

Based on our review and concerns about water quality and unclear or missing information, we have assigned a rating of EC-2 (Environmental Concerns – Insufficient Information) to the DEIS. For your reference, a copy of the rating system used in conducting our review is enclosed.

Thank you for the opportunity to review and comment on this DEIS. If you have questions about our comments, please contact me at (206) 553-1601 or by electronic mail at reichgott.christine@epa.gov or contact Theo Mbabaliye of my staff at (206) 553-6322 or by electronic mail at mbabaliye.theogene@epa.gov.

Sincerely,

Christine B. Reichgott, Manager
Environmental Review and Sediment Management Unit

Enclosures:
1. EPA Detailed Comments on the Cle Elum Reservoir Pool Raise Project
2. U.S. EPA Rating System

cc: Washington State Department of Ecology

EPA Detailed Comments on the
Cle Elum Reservoir Pool Raise Project

2-4

Surface Water Impacts and Wetlands

The DEIS identifies impaired waters in the project area and provides information about the status of applicable Total Maximum Daily Loads (TMDLs) (p. 3-16). Although the Cle Elum Reservoir is not listed on Washington State's 303(d) list for any water quality impairments and no TMDLs are currently in place for the Cle Elum Reservoir or the Cle Elum River, we note that the Cle Elum River immediately above and downstream of the reservoir and the upper Yakima River are impaired due to exceedances of the state water quality standard for temperature (p. 3-21). Similarly, the reservoir itself experiences summer temperatures that exceed the state standard, with a peak of 20°C (68°F) recorded in August 2012 at a depth of 3 ft. Other limiting water quality parameters for the reservoir include typically high phosphorus from June to September. Also, chlorophyll a concentrations, phytoplankton and zooplankton populations, and total organic carbon concentrations affect anadromous fish production (p. 3-19). Water quality within the reservoir and vicinity could be adversely affected if project construction activities, including blasting, surface grading, excavation, and surface pavement (e.g., at Speelyi Beach) alter the hydrology of springs and surface runoff such that erosion carries sediment to surface waters, and soluble pollutants enter local drainages and the underlying aquifer. In addition, groundwater extraction, land disturbance, material storage, waste disposal, inadvertent chemical or hazardous liquid spills, and compaction produced by vehicular traffic can all affect recharge to the local aquifer and groundwater quality.

We support measures that avoid and reduce impacts to the reservoir shoreline. By raising the reservoir pool 3 feet, there would be inundation of up to 46 acres of shoreline, resulting in loss of vegetation and habitat (up to 41 acres), including wetlands (up to 2 acres) and species intolerant of anaerobic conditions. This inundation alone would also increase current erosion of the reservoir shoreline area by up to 5 acres, resulting in sediment discharge into the reservoir causing increases in turbidity (up to 34,000 CY of material deposited in the reservoir) and nutrients from decaying vegetation. Although not evaluated in the DEIS, we are also concerned about cumulative impacts from erosion occurring in the vicinity of the analysis area, which could exacerbate sediment and nutrient loading in the reservoir, as well as in downstream waterways. For example, the DEIS indicates that much of the land surrounding the reservoir is zoned for commercial forest use, where forestry activities may cause significant erosion.

Given our concerns about potential impacts to water quality, we recommend the final EIS include the following:

2-5
- Discussion on cumulative impacts to water quality in the reservoir and downstream waterways from erosion that may occur as a result of land use activities in the vicinity of the project area.

2-6
- Updated information on the National Pollutant Discharge Elimination System (NPDES) permit application process and measures to protect water quality. (A permit will be necessary since the proposed project would disturb more than 40 acres.)

2-7
- Up-to-date information on the status of Clean Water Act Section 401 and 404 permit application processes and conditions to assure compliance with water quality standards and protection of aquatic resources.

2-8

Vegetation and Wildlife Impacts

The DEIS indicates that the proposed project would result in adverse impacts to vegetation due primarily to inundation and related loss of species and habitat. Overall, the project would result in a loss of about 30 acres of coniferous forest, 11 acres of deciduous tree/shrub, and 0.1 acres of herbaceous vegetation. Increased Reservoir pool level would also inundate about 2 acres of wetland and cause shifts in wetland vegetation composition and displacement of some species e.g., ground-nesting bird species, such as Canada goose, ruffed grouse, mallard, and mergansers. Loss of vegetation and wetlands would also affect nearly 46 acres of wildlife habitat, causing some species to relocate due to construction activities and others to lose foraging habitat or nesting sites. Wildlife would also be affected due to increased noise and traffic during construction and maintenance of the Reservoir. While we note that some of the impacts would be temporary and indirect, others would be direct, permanent, cumulative and unavoidable.

Because the project may affect federal and state species of concern in the project area and vicinity (p. 4-66), including threatened and endangered fish, we recommend that the final EIS include the following:

- Outcomes of initiated consultations with the U.S. Fish and Wildlife Service and National Marine Fisheries Service, including recommended measures to reduce risks to species and protect biota and habitat within the analysis area and vicinity. Similarly, a discussion on work with the Washington State Department of Fish and Wildlife will also be important.

2-9
- Information about plans for control of aquatic weeds in the reservoir.

2-10

Seismic risks

Because the Cle Elum Reservoir site is within the Yakima River Project where the Yakima Fold Belt has experienced tectonic folding and faulting in the past; the potential for landslides and slope movement in the analysis area and vicinity exists. Slopes can be inherently unstable due to weak underlying materials, or due to over-steepening or loading of existing stable slopes.

Seepage from the reservoir may also infiltrate both stable and unstable areas, resulting in increased pore pressures that could reactivate landslides or initiate new ones along Reservoir rims and abutments. A full Cle Elum Reservoir, for example, could result in groundwater seepage involving substantial volumes and high hydraulic conductivity, all of which could cause a rise of pore pressures and instability of low strength materials in the reservoir basin. Such seepage from the reservoir has the potential to infiltrate currently stable areas and may increase pore pressures such that slopes could become unstable and slide, particularly during earthquakes. Although there have been no recent landslides in the analysis area, we note that there are two mapped areas, one along the southwest shoreline and the other on the east shoreline near Wish Poosh Campground, that could experience mass wasting (p. 3-14). Because of that, we recommend that the final EIS include the following:

- Results of a seismic analysis or monitoring for the reservoir, including information on how seismicity was evaluated, and how it will be monitored and managed to reduce seismic impacts. A seismic map should either be referenced or included in the final EIS, along with information about appropriate seismic design and construction standards and practices that the project would use to reduce seismic risks.

2-10

- Map of areas that are susceptible to landslides and slope movement in the analysis area and vicinity including where construction activities would be located, along with assessment of slope stability, and determination of factors of safety and appropriate mitigation measures.

Monitoring

2-11

We recommend that the final EIS describe an environmental inspection and mitigation-monitoring program to ensure compliance with all mitigation measures and assess effectiveness. The final EIS should describe the program and its use as an effective feedback mechanism so that needed adjustments can be made to meet environmental objectives over the reservoir operation and maintenance period.

Because the reservoir has been in operation for over 80 years, the final EIS should also discuss results of monitoring programs that tracked previous management of the reservoir and document adaptive changes made and currently proposed. Lessons learned from past practices and adaptive management efforts, combined with the need to account for new challenges such as climate change, could influence the monitoring and adaptive management strategy for the proposed project.

2-12

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

<u>Environmental Impact of the Action</u>

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

<u>Adequacy of the Impact Statement</u>

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA <u>Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment</u>. February, 1987.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, Washington 98115

November 21, 2014

Candace McKinley
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Derek I. Sandison
SEPA Responsible Official
Director, Office of Columbia River
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902-3452

Re: Comments on the Draft Environmental Impact Statement for the Cle Elum Pool Raise Project

Dear Ms. McKinley and Mr. Sandison:

National Marine Fisheries Service (NMFS) has reviewed the draft environmental impact statement (DEIS) for the Cle Elum Pool Raise Project (CEPR), which is one of many projects that together comprise the Yakima Basin Integrated Plan (IP). NMFS has enthusiastically participated in the IP because it is a collaborative effort that has the potential to improve fisheries resources and water supplies in the Yakima Basin. NMFS' primary interest in the project is its potential to affect Mid-Columbia River steelhead, Chinook salmon, and coho salmon for which NMFS has jurisdiction through the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Management Act, Federal Power Act, and the Fish and Wildlife Coordination Act.

Our key comments for the DEIS public comment period are summarized as follows, and additional comments are provided in the attached comment form.

1. The DEIS is unclear and inconsistent regarding the effects of existing instream flows and the benefits and detriments of various alternatives on these flows and fish. NMFS recommends that the Final Environmental Impact Statement (FEIS) consistently describe the existing flow regime in the Cle Elum, upper Yakima, and lower Yakima Rivers, how that flow regime affects fish productivity, and how proposed flow changes under the alternatives would affect fish productivity. For example, the existing flow regime and potential effects in the Cle Elum River can be summarized as follows:

3-2

a. Winter flows (October-March) are lower than unregulated flows would be, which limits the amount and quality of rearing habitat available for juvenile salmonids. Therefore, alternatives that increase winter flows would increase juvenile survival, while alternatives that decrease winter flows would decrease juvenile survival.

b. Spring flows (April-May) are lower than unregulated flows would be, which decreases survival of outmigrating smolts. Therefore, alternatives that increase spring flows would increase smolt survival, while alternatives that decrease spring flows would decrease smolt survival.

c. Summer flows (July-September) are much higher than unregulated flows would be, which creates flows too fast for optimal rearing and decreases survival of juvenile salmonids. Therefore, alternatives that increase summer flows would decrease juvenile survival, while alternatives that decrease summer flows would increase juvenile survival.

The analyses under each alternative could then describe flow changes in terms of effects on habitat conditions and fish survival, and describe the resulting benefits or detriments as increases or decreases in survival.

3-3

2. As NMFS understands the proposed action, Alternative 2 and Alternative 3 would require that new CEPR storage be used for fish enhancement. Presumably, the U.S. Bureau of Reclamation (Reclamation) would account for how much water is provided by CEPR, and track the volume by charging against this "bucket[1]" when water is expended for fish enhancement. Therefore, to ensure that the project fully benefits fish enhancement flows as intended, it is critical to properly describe the flows in the Cle Elum River that would occur in the absence of the CEPR project.

The DEIS variously describes the No-action Alternative winter flows as "180 cfs [cubic feet per second] minimum" or as "180 cfs" and, under Alternative 2 and Alternative 3, proposes to increase winter flows to approximately 220 cfs. However, based on our review of data since 2000, winter flows already frequently exceed 180 cfs, and often are at or near 220 cfs even in the absence of CEPR. Therefore, the No-action Alternative should more precisely characterize the winter flow regime that would occur in the absence of CEPR, because reporting only the minimum flow misrepresents true conditions.

3-4

Most importantly, the DEIS fails to demonstrate how winter flow in the Cle Elum River would be charged to the CEPR fish enhancement bucket. It is evident from current operations that existing winter flows frequently exceed 180 cfs; therefore, not all water released in excess of 180 cfs should be counted toward the fish enhancement bucket. We request that Reclamation more clearly describe how releases of the fish enhancement water would be accounted for in the descriptions of Alternative 2 and Alternative 3.

[1] "Bucket" is typical terminology for water managers and stakeholders in the Yakima Basin for water storage capacity for a specified purpose.

3. The DEIS does not convey that interagency consultation on Reclamation's operation of
the Yakima Basin Project per Section 7 of the Endangered Species Act (ESA) is ongoing.
A major issue in that consultation is the adequacy of the existing flow regime to support
federally threatened steelhead and bull trout. The current instream flow regime is
insufficient for ESA-listed steelhead. NMFS has advocated for improved flows since
2001 and expects that one outcome of consultation will be improved flows in the Cle
Elum and Yakima Rivers. Therefore, even in the absence of the CEPR project, NMFS
expects that Reclamation would operate the water supply and delivery system to improve
instream flows in future winter and possibly future spring seasons. The relevance to the
3-5 DEIS is that the No-action Alternative, as currently described, does not include
reasonably foreseeable improvements to instream flows in the Cle Elum River.
Consequently, subsequent alternative analyses fail to make an accurate comparison of
anticipated instream flow conditions against the No-action Alternative.

Further, with respect to Alternative 2 and Alternative 3, the FEIS should clarify how the new CEPR storage would be used to improve fish production if the flows in the Cle Elum River would already have been improved through completion of the Yakima Basin Project consultation. For example, the FEIS should clarify whether Reclamation and Washington Department of Ecology (Ecology) expect that the new storage water would be used to further increase winter flows above and beyond what the Yakima Basin Project consultation will require, or do the agencies anticipate that the water would be used for other fishery enhancement scenarios?

4. All of the DEIS alternatives, including those eliminated from detailed study, rely solely
on additional storage infrastructure to meet the need to improve instream flows and water
supply reliability. As we have discussed with Reclamation, NMFS continues to believe
that Reclamation has opportunities to modify its storage and diversion operations to more
3-5A efficiently use existing infrastructure to meet needs for instream flow for fish and water
supply for irrigation. For example, increased winter flows for fish can be supplied in most
years with very little risk to irrigation water supply as shown by previous hydrologic
modeling. NMFS is not opposed to additional storage in the Cle Elum Reservoir, if
managed appropriately; however, a full range of reasonable alternatives in the FEIS
would include optimizing the use of existing stored water to meet current needs as well as
future challenges posed by climate change.

5. Statements are made throughout the DEIS that instream flows would be managed by
Reclamation with advice from the Systems Operations Advisory Committee (SOAC).
However, after a number of IP Operating Guidelines Group meetings in 2012 and 2013,
member organizations achieved consensus that Reclamation would be advised by an IP
Adaptive Management Group that included, but had broader representation than, the
3-6 SOAC members. This agreement is reflected in one or more documents produced by the
Operating Guidelines Group, including the Group charter and mission statement.
Therefore, NMFS requests that language throughout the FEIS recognize the role of the
Adaptive Management Group with clarification on the alternatives under which this
committee would function. Further, the purpose, history, and objectives of the Operations
Guidelines Group and the Adaptive Management Group should be added to the
introduction of the document to help the reviewer with context for future management.

6. Consideration of the planned permanent fish passage project at Cle Elum dam within the
CEPR DEIS is confusing. The permanent passage project is not included as a component
3-7 under the descriptions of any alternative, including the No-action Alternative. However,
throughout Chapter 4, Environmental Consequences, of the DEIS, there is an analysis of
the interaction between the CEPR and the passage project. Because there is no context for
the passage project as an alternative component, it remains unclear how the CEPR project
would affect the permanent fish passage project and vice versa.

Further, and of key importance to NMFS, the DEIS states that the CEPR project may
facilitate changing the outlet elevation of the fish passage facility (see DEIS page 4-7).
3-8 Since 2013, NMFS has on several occasions communicated to Reclamation its concern
that the designed outlet for the passage project may be too high. Consequently, NMFS
has concerns that the CEPR project would be used to justify redesigning the project to
raise the outlet even further.

7. Information in the DEIS regarding the distribution and abundance of federally-listed steelhead in the Cle Elum basin is outdated. NMFS requests that the following information be incorporated into the FEIS, including the alternatives analyses and the cumulative effects analyses addressing steelhead impacts:

   a. Reclamation biologists confirmed the presence of a number of steelhead redds in the Cle Elum River in the vicinity of the dam in 2014. This information should be incorporated into the Affected Environment and analyses sections of the FEIS.

3-9 b. Counts of adult steelhead passing Roza dam, which inform the analyses regarding
   steelhead abundance in the Cle Elum River, have doubled to tripled since the
   study cited in the DEIS. Counts are available for every year up to and including
   2014.

   c. Within the foreseeable future, as a result of planned construction and operation of fish passage facilities at Cle Elum dam, steelhead are likely to be present in Lake Cle Elum, the upper Cle Elum River, and its tributaries. Therefore changes to fish communities and habitat upstream of the dam have the potential to affect steelhead. These known and anticipated conditions must be acknowledged in the FEIS for an adequate assessment of effects to steelhead under each alternative.

8. The DEIS erroneously states that Reclamation has initiated Section 7 Endangered Species
Act consultation with NMFS for the construction and operation of the CEPR.
3-10 Reclamation has not yet initiated consultation with NMFS for CEPR, although pre-
consultation coordination has occurred.

9. The FEIS should include a more thorough evaluation of the adverse effects to fish habitat
3-11 that are likely to be caused by proposed shoreline protection of private and public land in
response to actions taken under any of the alternatives.

3-12 Please direct any questions or concerns regarding this letter to Sean Gross, Columbia Basin Branch, at sean.gross@noaa.gov or (509) 962-8911 ext. 225.

Sincerely,

Michael P. Tehan

Michael P. Tehan
Assistant Regional Administrator
Interior Columbia Basin Area Office
NOAA Fisheries, West Coast Region

Attachment: Comment Matrix

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

	Comment Number	Page Number	Section #, Figure #, or Table #	Comment
3-13	1.			Please see our letter dated November 21, 2014, for NMFS' key comments. The comments below are in addition to the comments in our letter.
3-14	2.	2-3	2.3	Construction and operation of the permanent Cle Elum Fish Passage project is not described as part of the No-action Alternative. However, in subsequent sections of the DEIS (starting at the end of Subsection 2.4.2, Additional Stored Water for Instream Flows, and continuing through Section 3, Affected Environment,), the interaction between that passage project and the Cle Elum Pool Raise (CEPR) alternatives are described. This inconsistency creates confusion regarding whether the passage project is being considered as an element of the No-action Alternative or as a Reasonably Foreseeable Future Action.
3-15	3.	2-15 and 4-6	Table 2-2 and Table 4-2	The referenced tables describe expected dates of inundation based on past hydrological conditions. However, because the project is intended in part as a buffer against projected climate change, it would be helpful to include expected dates of inundation under a climate change scenario. The relevant information should be readily available from the Riverware model results.
3-16	4.	Multiple	Multiple	The DEIS is clear that only Alternative 1, Alternative 2, and Alternative 3 are consistent with existing federal authorization and that Alternative 4 and Alternative 5 would require additional authorization to reallocate the benefits of the project from fisheries enhancement to Total Water Supply Available (TWSA). NMFS recommends the DEIS also reflect that only Alternative 2 and Alternative 3 are consistent with the Yakima Basin Integrated Plan (IP) Operating Guidelines Group charter, and that Alternative 4 and Alternative 5 are inconsistent with the charter. The charter was accepted by the IP Working Group and Implementation Committee after completion of the Integrated Plan itself and, therefore, best reflects the most recent position of the IP stakeholders on the intended purpose of the CEPR project.
3-17	5.	2-16	2.4.2	The DEIS states that stored water could be carried over "indefinitely to increase the reservoir level when smolts are outmigrating from the reservoir." NMFS' understanding has been that, under existing authorization, water cannot be carried over after "fill and spill" events. Please clarify if water could actually be carried over indefinitely, even after fill and spill events, to increase the reservoir elevation for smolt outmigration.

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

	Comment Number	Page Number	Section #, Figure #, or Table #	Comment
3-18	6.	2-25	2.4.5.2	The FEIS should clarify if the berm and campground are in an area that is subject to flooding by the Cle Elum River. If so, then the potential impact of the berm on floodplain function and off-channel habitat for riverine fish should be clarified in the analyses; the effect would be to the ecological floodplain (as opposed to regulatory floodplain) of the Cle Elum River, which would affect different fish species in different ways than would a berm that protects the campground solely from reservoir inundation.
3-19	7.	2-26	2.4.5.3	The FEIS should clarify if any of the described road sections are potentially flooded by the Cle Elum River, or if they are threatened only by a filling reservoir. This information will provide a more accurate analysis of effects than omitting this potential flooding effect.
3-20	8.	2-29	2.5.3.2	It is unlikely that existing stockpiles of logs from the reservoir would be wholly sufficient to supply the needs of proposed log revetments. In NMFS' experience, structures of the proposed type are typically engineered, and the engineering specifications require structurally-sound logs. It is unlikely that there is a large enough stockpile of logs that would meet the specifications to fully provide for proposed log revetments. It is likely that Reclamation/Ecology would need to purchase logs. These clarifications should be stated in the FEIS and analyzed appropriately.
3-21	9.	Multiple	Multiple	It would be helpful to define "drought" in the context of the IP and this DEIS because under Alternative 4 and Alternative 5, "drought" conditions would trigger specific operations to use carried-over water for delivery to irrigators. NMFS assumes, based on several years of discussion and as stated in the IP that the intention is for "drought" to refer specifically to years in which junior irrigation districts receive less than 70 percent of entitlement water supply. Please clarify if this is correct in the FEIS.

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

	Comment Number	Page Number	Section #, Figure #, or Table #	Comment
3-22	10.	2-35 to 2-37	2.6.2 and 2.7.2	Alternative 4 and Alternative 5 propose to use additional stored water for TWSA. Under current operations, TWSA is for multiple uses, including providing instream water for fish and providing irrigation water. However, Alternative 4 and Alternative 5 propose to only use the new TWSA water for irrigation in drought years, and otherwise carry over the water year after year. The NMFS requests that Alternative 4 and Alternative 5 be modified in the FEIS to clarify that any new TWSA would be used for both fish and irrigation purposes and to describe how new TWSA would provide benefits to multiple stakeholders. The water could be used for fish enhancement in several ways. When the risk of drought is high and/or the potential of refill is low, the water stored in the reservoir (as a hedge against drought for irrigators) would allow an earlier and longer season of smolt emigration from Cle Elum reservoir than the No-action Alternative. When the risk of drought is low and/or refill potential is high, the water could be used as described above or it could be released to enhance instream flows in the Cle Elum and Yakima Rivers.
3-23	11.	Multiple	Multiple	The effects of Alternative 2 through Alternative 5 would be more accurately depicted if the FEIS articulates that there would not generally be "increased flows" as a result of the project. A more accurate summary than what is presented in the DEIS is that the flows would be delayed by those alternatives and shifted across seasons. For example, those alternatives would generally reduce late spring or early summer flows in the Cle Elum River. Some parts of the document imply that the project would in fact create new water, when the project merely changes the timing of when that water would leave the reservoir.
3-24	12.	3-8	3.2.2, 2nd paragraph	The DEIS states that 126 thousand acre-feet of capacity is reserved for flood control capacity through mid-June. If this is accurate, how are sockeye smolts currently using the interim passage facility that is atop the spillway? NMFS' understanding is that the reservoir must be at full pool to pass smolts through the interim passage facility, and that passage usually occurs before mid-June. This issue must be addressed and accurately reflected in the FEIS analyses.

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

	Comment Number	Page Number	Section #, Figure #, or Table #	Comment
3-25	13.	4-2	Table 4-1	Changes in summer flows in the Cle Elum, Upper Yakima, and Lower Yakima Rivers should be included as impact indicators. Unnaturally high summer flows in the Cle Elum and Upper Yakima Rivers limit fish productivity (especially for steelhead that are emerging from redds during summer); unnaturally low summer flows in the lower Yakima River can impact a number of species and life stages.
3-26	14.	4-4	4.2.4.1, last paragraph	The DEIS states that "the additional storage would occur in spring when high flows from snowmelt fill the reservoir." However, this appears to partially contradict Table 2-2, which suggests that the average fill period would begin June 1, though filling could be expected in extreme years as early as April 21 or as late as June 24. (As stated in comment number 3, above, these dates should be addended with estimated dates under a climate change scenario).
3-27	15.	4-4	4.2.4.1, last paragraph	To understand the effects of the newly proposed storage on surface water and fish resources, NMFS requests that the FEIS precisely characterize potential filling scenarios. The effects on salmon and steelhead in the Cle Elum River for April and May filling would generally be negative because smolts are outmigrating during this period; further reducing flows is expected to decrease outmigration success. Filling during June and early July would not likely have significant effects in the Cle Elum River, but would reduce flows in the lower Yakima River where outmigration could be affected.
3-28	16.	Multiple, starting on 2-4	Multiple, starting under 2.4	Reclamation, with advice from SOAC and IP Adaptive Management Group, will need to craft rules for filling the extra reservoir capacity to reduce the impacts of filling during outmigration periods. There are likely to be some times when water is available for storage, but when storage would be more detrimental to fish than letting the flow pass the dam. This consideration would apply whether the storage is used for fish enhancement or TWSA. The FEIS would be much clearer than the DEIS with respect to impacts if it clarifies that such rules would be necessary under any alternative other than the No-action Alternative. NMFS requests that the framework of reservoir filling rules be described in the descriptions of each alternative in the FEIS, as the rules would affect both the impacts and the potential benefits described throughout the document.

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

	Comment Number	Page Number	Section #, Figure #, or Table #	Comment
3-29	17.	4-5, first line	4.2.4.1	The analyses of the relative benefits and detriments of reservoir filling in spring and drawdown in winter should be improved in several ways. From this page and line number, comparison of <u>minimum</u> winter flows to <u>average</u> spring flows distorts the impacts of the alternative between seasons. If the FEIS is to include a comparison between seasons, the analysis, the comparison should be for average winter flows to average spring flows, and/or a comparison for minimum winter flows to minimum spring flows.
3-30	18.	4-5, first line	4.2.4.1	The analyses of the relative benefits and detriments of reservoir filling in spring and drawdown in winter should be improved in several ways. From this page and line number, the relevance of winter flows in the Cle Elum River to spring flows in some unidentified reach of the Yakima River is unclear. The relevant reaches of the Yakima River for assessing the impacts of further reducing spring flows are those reaches where low spring flows have already been identified as critically low for smolt outmigration. Such reaches have been identified during various studies; the most recent is the Integrated Plan, which identifies increasing flows in the Roza and Wapato reaches as a high priority. Of those reaches, Alternatives 2 through 5 would have the most potential to impact the Roza reach. Therefore, NMFS requests that the quantitative analysis of impact to spring flows in the FEIS focus on the Roza reach of the Yakima River.
3-31	19.	4-5, first line	4.2.4.1	The analyses of the relative benefits and detriments of reservoir filling in spring and drawdown in winter should be improved in several ways. Related to this page and line number, low spring flows are a known major problem for fish in the Yakima Basin. Reclamation, Ecology, and the Joint Board have sponsored a study of the relationship between spring Chinook smolt survival and flows in the Roza reach of the Yakima River. The data and analysis to date clearly indicate that lower spring flows increase smolt mortality. NMFS requests that the FEIS use the available analysis, specifically the regression curve of survival versus flow, to quantify how survival in the Roza Reach will be affected by springtime filling of the newly proposed storage at Cle Elum dam and incorporate this information into the FEIS.

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

	Comment Number	Page Number	Section #, Figure #, or Table #	Comment
3-32	20.	4-12, last paragraph	4.2.6.3	As stated in the DEIS, "The figure shows slightly reduced flows in the spring when the reservoir is filling and slightly increased flows during the summer…" While this statement is correct, NMFS requests that the FEIS include a more accurate statement that both of these flow changes would exacerbate the existing flow problems in the Cle Elum and upper Yakima Rivers for salmon and steelhead.
3-33	21.	4-39	4.6.2, 1st sentence	NMFS suggests clarifying that the "low flow conditions" that specifically impact fish are the abnormally low winter flows and the abnormally low April-May outmigration flows. This is distinguished from summer flows, which are problematic for fish because they are unnaturally high as a result of operations of Cle Elum dam.
3-34	22.	Multiple	Multiple	The document generally concludes that the extensive bank stabilization proposed would not have major effects on fish because the structures would only be in the water an average of 40days per year. However, such structures are likely to alter the shore area waterward (and below) the structures by deflecting wave energy back toward the lake. This generally results in erosion of the shoreline waterward of the structures and leads to a coarsening of the substrate, which can affect fish habitat. Some of the bio-engineered structures proposed under Alternative 3 and Alternative 5 would dissipate more, and deflect less, wave energy and, therefore, have different impacts to the shoreline environment and fish habitat than would the rock structures proposed under Alternative 2 and Alternative 4. These impact distinctions should be made clear in the FEIS analyses. Because the structures would affect the shoreline waterward (and below) of the structures themselves, the DEIS underestimates the duration of time that fish would be exposed to the impacts caused by the structures; effects would occur even when reservoir elevations are below the structures. This impact should be clearly provided in the FEIS alternative analyses.

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

	Comment Number	Page Number	Section #, Figure #, or Table #	Comment
3-35	23.	4-43	4.6.4.2, 1st paragraph	The DEIS states that Alternative 2 "would incrementally bring the Cle Elum River closer to unregulated flows…" If the CEPR was used to augment winter flows, then the preceding statement would generally be true for the winter season only. Under any alternative, the statement is not accurate for the springtime when the new storage capacity would be filling, further reducing already abnormally low spring flows. In addition, Alternative 2 and Alternative 3 would not generally bring summer flows closer to unregulated flows because summer flows would be unaffected. NMFS requests that these clarifications be provided in the FEIS alternative analyses. As stated under comment number 16, and in our cover letter, the period of "spring" that is most relevant and distinct from a fish resource perspective in the Cle Elum River is April-May. Therefore, NMFS requests that the FEIS be modified to describe flow changes in that seasonal context for the public to understand the effects of each alternative on fish resources.
3-36	24.	4-43	4.6.4.2, 2nd paragraph, 1st sentence	The DEIS states that flows in the Cle Elum River would increase in the spring. This conflicts with other subsections of the DEIS and with Table 2-2 and Table 4-2 that show reservoir filling during spring, which would reduce river flows. These inconsistencies should be addressed in the FEIS.
3-37	25.	4-44	4.6.4.2, last sentence	This sentence of the DEIS concludes that filling the additional storage would have no impact. This is inaccurate because under the No-action Alternative, the reservoir would be full and spilling all inflows during this time. Under the No-action Alternative, those spilled flows would otherwise aid smolt outmigration in the Cle Elum and Yakima Rivers, if the spill occurred during the outmigration period of April-June. For those years when additional storage fills later in the early summer, there would still be a change in flows downstream, but with less impact to fish. This inaccuracy should be addressed in the FEIS.
3-38	26.	4-65	4.9.2, 2nd paragraph	This paragraph states that Alternative 4 and Alternative 5 would not benefit fish. However, it would be more accurate to conclude that Alternative 4 and Alternative 5 would be <u>detrimental</u> to fish by exacerbating the existing problems of low winter and spring flows and high summer flows in the Yakima and Cle Elum Rivers. This inaccuracy should be addressed in the FEIS.

Review Comments for the
Cle Elum Pool Raise DEIS
From National Marine Fisheries Service (NMFS)
November 21, 2014

Comment Number	Page Number	Section #, Figure #, or Table #	Comment
27.	4-146	4.24.1.2	This subsection should mention that a major effect of current Water Management Practices is the flow regulation of the Cle Elum and Yakima Rivers. The result has been alteration of riverine and floodplain ecosystems and a major decline in the productivity of salmon and steelhead.

3-39

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
Central Washington Field Office
215 Melody Lane, Suite 119
Wenatchee, WA 98801

In Reply Refer To:
2015-CPA-0007

December 5, 2014

Memorandum

To: Candace McKinley, Environmental Program Manager, Bureau of Reclamation
Yakima, WA

From: Manager, Washington Fish and Wildlife Office
Lacey, Washington

Jessica L Gonzales for
Thomas C. McDowell,
Acting Manager

Subject: U.S. Fish and Wildlife Service Comments on the Cle Elum Pool Raise Project Draft Environmental Impact Statement

The U.S. Fish and Wildlife Service (Service) appreciates the opportunity to review and provide comments on the Draft Environmental Impact Statement (DEIS) for the proposed Cle Elum Reservoir Pool Raise Project (Project). The Project is a component of the Yakima River Integrated Water Resource Management Plan (Integrated Plan). The DEIS evaluates four Action Alternatives that all include modifying the existing spillway radial gates at the Cle Elum Dam to raise the reservoir pool by 3 feet. Modifying the gates allows for an additional 14,600 acre-feet of water storage and release capacity in the reservoir.

Attached for your consideration are the Service's comments on the Project DEIS. These comments have been closely coordinated with the Service's Mid-Columbia River Fishery Resource Office and reflect our
4-1 conference call with you on November 19, 2014.

We appreciate having had the opportunity to provide input on the DEIS for the proposed Project. We look forward to continued coordination with Reclamation on the development and implementation of the Integrated Plan. Please contact Steve Lewis, Fish and Wildlife Biologist by phone at 509-665-3508 ext. 2002, or by e-mail at Stephen_Lewis@fws.gov for questions regarding the comments contained herein. Specific questions regarding the development and implementation of the Integrated Plan should be referred to Jeff Thomas, Fish and Wildlife Biologist by phone at 509-575-5848 ext. 225, or by e-mail at Jeff_Thomas@fws.gov.

cc:
USFWS, Yakima Sub-Office, Yakima, WA (J. Thomas)
USFWS, Yakima Sub-Office, Yakima, WA (R. Visser)
USFWS, Mid-Columbia River Fishery Resource Office, Leavenworth, WA (J. Craig)
USFWS, Mid-Columbia River Fishery Resource Office, Leavenworth, WA (K. Terrell)
WDFW, Ephrata, WA (C. Davidson)

Attachment

Cle Elum Pool Raise Project
Draft Environmental Impact Statement
U.S. Fish and Wildlife Service Comments – Central Washington Field Office

	Section #	Page number & Line Number	Category (e.g., Alternatives, Impacts)	Agency (and commenter)	Existing Text	Comment/Suggested Revision
	2					
4-2	2.1	2-1	Introduction	USFWS – J. Neibauer		As you are aware, Reclamation is currently consulting with the USFWS on the effects of the Yakima Basin Irrigation Project on threatened and endangered species. Please explain, where appropriate in this document, how this proposed action (i.e., pool raise) would link to and change (maintain, increase or decrease) effects to threatened and endangered species beyond such levels e established in the Ongoing Operations and Maintenance biological assessment in all applicable Yakima Basin Irrigation Project areas. A table might be useful to display changes in the key project elements.
4-3	2.3	2-4	Alternative 1 – No Action Alternative	USFWS – S. Lewis		Please explain in the FEIS how the additional water created from the pool raise will be allocated between proposed fish passage facilities and instream flows downstream
4-3						from Cle Elum Reservoir. Please explain the role of the System Operations Advisory Committee (SOAC) in this allocation of water.
	4					
4-4			General Comment	USFWS – S. Lewis		Please describe how the shoreline protection measures will be executed (i.e., techniques) to minimize the scope and extent of environmental consequences (shoreline erosion) resulting from the pool raise and additionally explain any implementation effects of conducting the shoreline protection.
4-5			General Comment	USFWS – S. Lewis		No comprehensive mitigation plan has been identified to address associated environmental impacts. At a minimum, please include a placeholder for such a plan which identifies and implements a monitoring and evaluation plan to assess impacts associated with the pool raise.
	4.6					
4-6	4.6.2	4-39	Summary of Impacts	USFWS – S. Lewis	"Reclamation does not expect significant changes in habitat access within	Please explain in the FEIS how the proposed pool raise would improve access to tributaries

	Section #	Page number & Line Number	Category (e.g., Alternatives, Impacts)	Agency (and commenter)	Existing Text	Comment/Suggested Revision
4-6					the reservoir or between the reservoir and tributaries."	for fish species, if at all.
4-7	4.6.8	4-47	Mitigation Measures	USFWS – S. Lewis	"Reclamation would also evaluate tributary mouths to determine if there is degrading of fish passage by the higher water levels. If there were problems identified, Reclamation would work with WDFW to identify and implement appropriate mitigation measures."	If applicable, please list measures Reclamation would implement in the event tributary barriers are formed as a result of the proposed pool raise. We request the USFWS to be included in any development and implementation of these measures. Currently only WDFW has been identified in the DEIS as assisting in this development.
	4.9					
4-8	4.9.2	4-65	Summary of Impacts	USFWS – J. Neibauer		For the purpose of efficiency when conducting any future Endangered Species Act Section 7 consultation, we suggest that Reclamation utilize the USFWS Matrix of Pathways and Indicators when analyzing impacts of the proposed project on bull trout and its critical habitat.
4-9	4.9.4.1	4-67	Northern Spotted Owl and Marbled Murrelet	USFWS – S. Lewis		Please clarify the proportions of northern spotted owl habitat which would be classified as foraging, roosting, dispersal, or breeding habitat with

	Section #	Page number & Line Number	Category (e.g., Alternatives, Impacts)	Agency (and commenter)	Existing Text	Comment/Suggested Revision
4-9						reference to the 30 acres of conifer forest and 11 acres of deciduous tree and shrub habitats that would be inundated by the pool raise.
4-10	4.9.4.1	4-67	Operation	USFWS – S. Lewis	"Reclamation would evaluate the mouths of tributaries following the initial pool raise to confirm that there is no reduced passage."	Please identify how the BOR would address any potential reductions in fish passage for either for spawning/rearing or forage/migration in tributaries (i.e., both large and small fish bearing tributaries of the Cle Elum Reservoir) resulting from the initial stages of the pool raise.
4-11	4.9.4.1	4-67	Bull Trout	USFWS – S. Lewis		Please provide current literature that supports why the pool raise would improve reservoir productivity and habitat complexity.
4-12	4.9.4.2	4-68	Alternative 2	USFWS – S. Lewis		Please clarify how flow augmentation resulting from Alternative 2 is likely to benefit bull trout downstream from Cle Elum Dam. If the point of origin would initially differ from the Cle Elum Reservoir outlet for these flow augmentation releases, please describe effects to other tributaries and downstream channels in the area of other projects (i.e., lower Kachess,

	Section #	Page number & Line Number	Category (e.g., Alternatives, Impacts)	Agency (and commenter)	Existing Text	Comment/Suggested Revision
4-12						Yakima River, Tieton River, Bumping/American River, and the Naches River).
4-13	4.9.4.3	4-70	Northern Spotted Owl and Marbled Murrelet	USFWS – S. Lewis	"Construction noise could have an adverse impact on northern spotted owl if they were located within 72 feet of construction; however, Reclamation knows of no nest or detection locations within 1 mile of any construction activities (USFS 2014).	USFS 2014 is based on incomplete or alternative owl survey protocols and may not truly depict owl activity in the project area. Please include all relevant information that utilizes the most up to date survey protocols when assessing owl activity in the project area.

State of Washington
Department of Fish and Wildlife
Mailing Address: 600 Capitol Way N. • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington St. SE • Olympia, WA
Region 2 Office - 1550 Alder Street - Ephrata, WA 98823

November 25, 2014

Dawn Wiedmeier
U. S. Bureau of Reclamation
Area Manager
1917 Marsh Road
Yakima, WA 98901

Derek I. Sandison
Director, Office of Columbia River
Washington State Department of Ecology
303 S. Mission Street
Wenatchee, WA 98801

RE: WDFW Comments to the Cle Elum Pool Raise Project Draft EIS – A component of the Yakima River Integrated Water Resource Program PEIS

Dear Ms. Wiedmeier and Mr. Sandison,

5-1 The Washington Department of Fish and Wildlife (WDFW) appreciates the opportunity to provide comments to the September 23rd, 2014 Draft Environmental Impact Statement (EIS) issued for the Cle Elum Pool Raise Project, a component of the Yakima River Integrated Water Resource Management Plan (YBIP) in accordance with the National Environmental Policy Act[1] (NEPA) and the State Environmental Policy Act[2] (SEPA). Collaboration among WDFW, the Washington Department of Ecology (Ecology), the U. S. Bureau of Reclamation (Reclamation), the Yakama Nation, and other local, state, and federal resource and planning agencies has remained crucial to develop and implement a comprehensive water resource program that responds to existing and forecasted water demands and improves conditions for fish, wildlife, and their habitat in the Yakima River basin.

[1] Public Law 91-190
[2] Chapter 43.21C RCW and the SEPA Rules (Chapter 197-11 WAC).

5-2 The Draft EIS evaluates four Action Alternatives that all include modifying the existing spillway radial gates at Cle Elum Dam to raise the reservoir pool by 3 feet. Modifying the gates allows for an additional 14,600 acre-feet of water of storage and release capacity within the reservoir.

Each Action Alternative includes shoreline protection methods that rely on riprap stabilization or a "hybrid" approach using riprap and various bioengineered techniques. Reclamation and Ecology propose two alternatives for allocating and using the additional stored water: (1) instream flow only or (2) pursuing congressional authorization to use the additional stored water for both instream and out-of-stream uses.

5-3 WDFW staff has reviewed the No Action Alternative and the four Action Alternatives proposed in the Draft EIS. As proposed in the Draft EIS, WDFW does not support Alternative 1 – the No Action Alternative because it conflicts with the purpose of the YBIP and does not proactively contribute to the ecological health of the basin or water storage and supply demands.

WDFW supports modifying the existing radial gates to allow an additional 14,600 acre-feet of storage in the reservoir and a "hybrid" shoreline protection approach that will improve and increase riparian habitat for fish and wildlife. However, until additional water storage is available, as envisioned in the YBIP, capable of providing flexible water operations during below average run-off years, WDFW recommends the 14,600 acre-feet of additional water be used to assist with the operation of the Cle Elum Fish Passage Facility. Increasing the probability that the reservoir reaches surface elevation 2,180 feet as early as possible in April to accommodate out-migrating juvenile fish is vital to ensure the operation of the Cle Elum Fish Passage Facility is successful. WDFW and Reclamation are currently working on a Fish Passage Operations Agreement (Draft). WDFW has requested the agreement be included as an appendix to the Final Cle Elum Pool Raise Project EIS.

5-4 If later a decision is made to use the additional storage to improve winter flows in the lower Cle Elum River, it is uncertain how fish survival, productivity, and habitat will change in the Cle Elum River as a result of an additional 36 cfs over 6 months. Please work with WDFW and other fishery co-managers to develop and implement a monitoring program to evaluate how operational changes at Cle Elum Dam affect habitat in the Cle Elum River.

5-5 WDFW supports the intent of the YBIP and is encouraged by Reclamation and Ecology's commitment to ensure habitat and watershed protection actions support healthy fish populations, while taking the necessary steps to recover federally threatened bull trout[3] and Northern spotted owl populations within the YBIP project areas.

EIS review and general resource concerns and/or comments regarding all Action Alternatives of the Cle Elum Pool Raise Project are attached as Appendix A. If you have questions or concerns, please don't hesitate to contact me at (509) 424-1757 or at michael.livingston@dfw.wa.gov.

Sincerely,

Mike Livingston,
Region 3 Director

5-6 [3] Federal and state resource agencies and the Yakama Nation are working on a Bull Trout MOA to implement bull trout recovery actions throughout the basin that WDFW recommends be incorporated in the Final Cle Elum Pool Raise Project EIS and subsequent project-level YBIP EISs when applicable.

APPENDIX A

Cle Elum Pool Raise Project – DRAFT EIS

	Page Number or Figure	EIS Review Comments
5-7	Figure 2-4	Although the additional inundation appears small, it has the potential to impact spawning area for anadromous fish. There is some really nice spawning gravel in this area and some sockeye probably spawn around here. Anadromous fish are put in here in the fall, some may spawn here while the pool is down, redds could become submerged during the incubation period as the pool fills, which has the potential to impact their survival. Please provide what proportion of suitable spawning habitat will be affected by the proposed project (both lineal distance and spawning gravel proportion relative to the total; please describe how the changes may impact current carrying capacity estimates for sockeye.
5-8	2-19	Location of roads (on this page throughout the EIS) should be identified so impacts to fish, wildlife, and their habitat can be evaluated.
5-9	2-21	A figure showing proposed areas of forest clearing (on this page and throughout the EIS) should be identified so impacts to fish, wildlife, and their habitat can be evaluated.
5-10	2-29	Loss of littoral habitat in the reservoir needs to be evaluated and adequate mitigation should be proposed (e.g. using perched-beach concept).
5-11	2-47	Please clarify why lake trout and Kokanee populations would generally decline; please define what period increased flows are expected to occur under Alternative 2.
5-12	2-47 and 2-48	"No fill and spill of unregulated flow until lake reaches 2,243 means lower smolt passage flows down river until the additional 14.6 KAF is stored". The timing would not reduce the benefit for sockeye smolt passage through the Cle Elum Dam Fish Passage Facility, which would occur before the irrigation season. In addition, flow releases for irrigation can occur through the juvenile facility rather than the dam outlet works, thus providing dual benefits (fish passage and irrigation).
5-13	2-52	Please clarify how fish species that breed in the spring will be impacted from lower spring flows.
5-14	2-53	Surveys should be conducted for Northern spotted owls prior to construction during breeding and nesting seasons. A follow-up survey should be conducted to ensure owls are not foraging within or near the project footprint.
5-15	2-53	Please note when referring to downstream benefits to bull trout…There may be fluvial bull trout in the upper Yakima River that utilize FMO habitat in the lower Cle Elum River.
5-16	3-1	The area of impact analyzed in the EIS should not be limited to the upper Yakima, impacts to aquatic resources downstream from the Naches reservoirs should be considered due to changing Cle Elum Reservoir operations.
5-17	3-22	It is unclear if an analysis was completed that looked at late spring flow impacts on the thermocline and the temperature change in the outflow.
5-18	3-31	Please update to add 2014 adult sockeye returns to Prosser Dam (2,676) and Roza Dam (2,517).
5-19	3-38	PHS habitats in this area also include Cliffs and Wetlands.
5-20	3-42	Please include: There are historical nesting records (Northern spotted owl circles) on the west side of the reservoir.
5-21	3-43	There should be more than 200 year old stands of lodgepole pine (not less than as stated in the text)
5-22	3-59	Regarding the WDFW Bell Property: Portions of the area will be impacted by shoreline protection methods. Please work directly with WDFW to ensure impacts are adequately mitigated including but not limited to repositioning the toilet, re-routing the road, and replanting vegetation to protect and enhance wildlife FMO habitat. In addition, please coordinate with WDFW to reduce and/or avoid impacts to recreational opportunities in on this property (e.g. boating, fishing, camping, etc.).
5-23	4-23	Please include wildlife as a resource that will be impacted by shoreline protection strategies.
5-24	4-27	Impacts to bull trout and other species may be impacted by changes in sediment deposition in the Cle Elum River. Increased sedimentation could have adverse impacts on bull trout and other fish species that become stranded by "sediment" barriers.
5-25	4-42	The last paragraph states that the increased reservoir surface area will not decrease the quantity or quality of habitat for any species. There is the potential that some spawning habitat could be lost if there is carryover that inundates some portion of the upper Cle Elum River. While the effect may be small, it is misleading to suggest there will be no impact. Please revise this to include a quantified lineal stream distance that may be inundated and the proportion of that habitat that may be utilized by the various life stages of various fish taxa.
5-26	4-49	Loss of woody vegetation that cannot survive will impact wildlife species dependent on it. Please evaluate impacts to wildlife from loss of woody vegetation/habitat. In addition, any loss of cottonwoods would reduce perching habitat for bald eagles.
5-27	4-51	The NWI shows Laucstrine Littoral wetlands within the project footprint. Please update.
5-28	4-56	Please update: Oregon Goldenaster populations were identified by WDFW YBIP staff in September 2014 along CleElum river in the inundation zone. One population was mapped and submitted to WNHP database; others were identified but not able to be mapped. Impacts of additional inundation to these populations should be evaluated.
5-29	4-58	Wetland habitats at Wish Poosh should be surveyed to quantify total habitat suitable for nesting birds; WDFW staff have observed beavers and nesting habitat for various birds. Examination of how the additional inundation would affect these habitats should be quantified and impacts assessed.
5-30	4-65	The pool raise could (not necessarily would) provide a benefit for foraging/over-wintering fluvial bull trout downstream of Cle Elum Dam if the additional storage is used to increase winter flows.
5-31	4-68	Please quantify lineal stream distance, or stream area in m^2 that will be accrued in side channels and off channel habitats that will benefit bull trout, steelhead and other fish species in the lower Cle Elum River and for what frequency (x years out of 10).
5-32	4-69	There are historical records on the west side of the reservoir for Grizzly bear and the

		area is within the North Cascades Grizzly bear recovery area, there is potential for Grizzly bears to be in the area. There is also potential that Gray wolves could be in the area, as there are known packs nearby – Section 3.9.4 of the EIS references documented records of Gray wolf and Grizzly bear within the project area.
5-33	4-70	Please ensure noise levels (dbA) and the noise disturbance zone for Northern spotted owls is consistent within the EIS.
5-34	4-154	In addition to coordinating with USFWS, please coordinate with WDFW to survey and manage State Listed and/or Priority Habitat and Species (PHS) that may be in the area and could be impacted. Please work with WDFW to minimize impacts.
5-35	4-155	WDFW recommends, in coordination with WDFW and USFWS, implementing a monitoring protocol to assess wetland and riparian habitat seasonally impacted by the pool raise are transitioning at a pace expected.

General Resource Comments

5-36 • Please better describe how climate change forecasts may affect water supply in the Yakima Basin under the No Action Alternative; particularly refill scenarios.

5-37 • In order to mitigate for vegetation loss resulting from inundation and permanent structures, total acres impacted and the type of vegetation lost should be included in the EIS.

5-38 • WDFW recommends Reclamation and Ecology work with local, state, and federal agencies, tribes, and the Kittitas Conservation Trust to implement habitat restoration below the dam to enhance rearing and spawning habitat that may be impacted by the pool raise. There are several restoration projects that have been completed below the dam that could be assessed.

5-39 • Reclamation and Ecology should ensure the Final Bull Trout MOA (Draft) includes Reclamation maintenance strategies to ensure artificial fish barriers are not created in the mouth of tributaries or in the reservoir from changes in sediment depositions. WDFW recommends the Final Bull Trout MOA, is incorporated in the Final Cle Elum Pool Raise Project EIS, as well as subsequent YBIP project-level EIS when applicable.

5-40 • WDFW recommends assessing stranding impacts as the pool is drawn down and the tributary flows decrease.

5-41 • Access should be provided into the tributaries for all resident native fish and anadromous rearing fish in the Cle Elum pool.

5-42 • Since this project provides improvements to the existing Wish-Poosh boat launch to account for increased pool storage, WDFW recommends extending the boat launch so the reservoir can be accessed at low-pool. Extending the boat launch would provide additional recreational fishery benefits.

5-43 • Reclamation and Ecology should work with WDFW staff to monitor changes in the reservoir

5-43 to gain a better understanding of the relationship between changes in littoral habitat and near shore fish distribution, evaluate how an increase in water volume in the pool will affect primary and secondary productivity, and assess bull trout recovery limiting factors in the reservoir.

Comment Letter 6

Washington State Department of Transportation

Lynn Peterson
Secretary of Transportation

South Central Region
2809 Rudkin Road
Union Gap, WA 98903-1648

(509) 577-1600 / FAX: (509) 577-1603
TTY: 1-800-833-6388
www.wsdot.wa.gov

November 25, 2014

U.S. Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, WA 98901-2058

Attention: Ms. Candace McKinley, Environmental Program Manager

Subject: Comments – Cle Elum Pool Raise Project Draft Envirionmental Impact Statement, Kittitas County, Washington

6-1 We have reviewed the Draft Environmental Impact Statement for the Cle Elum Pool Raise Project. We have the following comments.

- Based on the documentation provided regarding changes to downstream flows and the effects on WSDOT infrastructure, we do not identify a significant adverse impact to our system.

6-2
- All loads transported on WSDOT rights-of-way must be within the legal size and load limits, or have a valid oversize and/or overweight permit.

6-3
- It is the applicant's responsibility to keep and maintain SR 903 and I-90 free of any of their debris. Any spilled material shall be promptly cleaned up at the applicant's expense.

6-4 Thank you for the opportunity to review and comment on this scoping proposal. If you have any questions regarding our comments, please contact Rick Holmstrom at (509) 577-1633.

Sincerely,

Paul Gonseth

Paul Gonseth, P.E.
Planning Engineer

PG: rh/mls

cc: File #4, SR 903
Terry Kukes, Area 1 Maintenance Superintendent

p:\planning\devrev\BurRec_Cle Elum Pool Raise Draft EIS.docx

Comment Letter 7

KID
KENNEWICK IRRIGATION DISTRICT

November 18, 2014

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, WA 98901-2058

RE: Comments, Cle Elum Pool Raise Draft Environmental Impact Statement

Dear Ms. McKinley,

7-1 The Kennewick Irrigation District has reviewed the Draft Environmental Impact Statement (DEIS) for the Cle Elum Pool Raise Project, and has the following comments:

The DEIS document includes instream flows scenarios for the additional stored water that would be available as a part of the Cle Elum Pool Raise Project. One scenario that is evaluated includes using the additional stored water for winter instream flows of around 36 cubic-feet per second (cfs) for 6 months (page 4-6); another scenario evaluates using the additional stored water as carry-over to assist in juvenile out-migration from the reservoir (page 4-7); and a third scenario examines using the additional stored water as a part of Total Water Supply Available (TWSA) (page 4-11).

7-2 An additional scenario that should be considered in the final EIS is using the additional stored water for upstream adult migration in the summer irrigation season. Currently, the System Operations Advisory Council (SOAC) uses portions of the Yakima Basin Water Enhancement Project (YRBWEP II) conserved water as "pulse flows" to aid in the upstream migration of adult salmonids (such as sockeye) during the low flows of summer. Generally speaking, these "pulse flows" appear to be unsuccessful when the ambient air temperatures are high; the result is a slug of warm water that is unsuitable for salmonids and is basically wasted since it does not help fish migration and it cannot be diverted for out-of-stream use. However, SOAC is already using YRBWEP II conserved water for summer pulse flows, and the language in YRBWEP II governing the use of such water states that the water is "exclusively dedicated to instream flows or use by the Yakima Project Superintendant as flushing flows or otherwise advised by the System Operations Advisory Committee." Accordingly, the final EIS should evaluate the use of the additional stored water for summer instream use because past practices show that such use appears to be a use of the water that is likely to occur.

7-3 For the record, the Kennewick Irrigation District does not support using the additional stored water as summer "pulse flows," as the best available evidence shows that such flows are ineffective at aiding the upstream movements of adult salmon due to the high water temperatures in the lower Yakima River, and such additional flows do not

7-3 significantly lower the water temperatures, which are almost entirely in equilibrium with ambient air temperatures.

7-4 On a related note, KID is also extremely interested in the impact, if any, that this project would have on the target flows at Prosser Dam, as described in the Yakima Basin Water Enhancement Project, Title XII (October 31, 1994). Any attempt to increase target flows at Prosser Dam constitute impairment of KID's water right and a taking to the extent KID would receive less water than it would have prior to the project. The DEIS notes that if the additional stored water is used as a part of TWSA that the target flows would likely increase somewhat in average to wet years during the summer. If a summer pulse flow use of the additional stored water, as described above, is considered KID would like an evaluation of the impacts on the target flows at Prosser Dam.

7-5 In addition, on page 4-12, the DEIS states that under the TWSA scenario, proratable water users such as Kittitas Reclamation District, Roza Irrigation District, and KID (to a lesser extent) would benefit. KID's water supply is nearly all return flows. KID has never called for releases from storage to meet its water supplies because such a call would compromise KID's ability to benefit from diverting all flows in excess of YRBWEP II target flows at Prosser Dam. In reality, this project, even if the additional stored water was considered as part of TWSA, would not improve the water supply of the KID, even if return flows from upstream water users whose diversions are above Parker Gage are considered in the modeling, which from our understanding is not the case.

Thank you for the opportunity to comment on the draft environmental impact statement.

Sincerely,

Gene a Huffman

Gene Huffman
Board Vice President
Kennewick Irrigation District

cc: Charles Freeman, KID
Seth Defoe, KID
Brian Iller, Rettig, Osborne, and Forgette
Dawn Wiedmeier, USBR
Derek Sandison, Ecology

American Rivers — Rivers Connect Us | Trout Unlimited | The Wilderness Society

November 25, 2014

Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima WA 98901

Derek Sandison
Director, Office of Columbia River
Department of Ecology
15 W. Yakima Ave., Ste 200
Yakima, WA 98902

Delivered via email to: cepr@usbr.gov

Re: Comments on Draft EIS for Cle Elum Pool Raise

Dear Ms. McKinley and Mr. Sandison:

8-1 Please accept this letter as the joint comments of American Rivers, Trout Unlimited, and The Wilderness Society on the Draft Environmental Impact Statement (DEIS) for the proposed Cle Elum Pool Raise. We support the Cle Elum Pool Raise as a component of the Yakima Basin Integrated Plan (Yakima Plan). In our view, the pool raise must be constructed in association with permanent and effective up- and downstream fish passage at Cle Elum Dam. Together, these projects, along with congressional designation of the upper Cle Elum River system as Wild and Scenic as called for by the Yakima Plan, will help realize the vision for protecting and restoring numerous salmonid species to the upper Cle Elum basin, including a large run of sockeye salmon.

8-2 We support DEIS Alternative 3, which will provide the most benefit for native fish while minimizing the visual and environmental impacts of the three foot pool raise. We support this alternative for two overarching reasons:

8-3 First, it has become clear through our discussions with Yakama Nation, federal, and state fisheries biologists that the additional stored water made possible through the pool raise must be used for fisheries purposes as spelled out in the 1994 Yakima River Basin Water Enhancement Project authorization. This is needed to maximize the reliability of the to-be-constructed juvenile fish passage structure at Cle Elum Dam as well as to improve flexibility to meet downstream instream flow targets. This use of the additional stored water is consistent with an agreement among the Yakima Plan Implementation Committee and Workgroup, and is essential to maintaining our support for the pool raise.

8-4 While we will look forward to the benefits the additional stored water can provide for salmon, steelhead, and bull trout and juvenile fish passage, more detail would be useful on how the additional stored water will be used, and how and when uncertainty about that use will be resolved. For instance, the Adaptive Management Group discussed among the Yakima Plan stakeholders should play a role, perhaps along with the Systems Operations Advisory Committee mentioned in the DEIS, in determining how the newly stored water is used each year to benefit fish – this should be clarified in the final EIS.
8-5 In addition, the final EIS should better reflect existing water management regimes. The no action alternative currently understates existing winter flows in the lower Cle Elum (180 cfs instead of the 200+ cfs that have recently been achieved). Our sense is that more detailed consultation with federal, state, and Yakama Nation biologists would be helpful in accurately reflecting the current baseline and for refining how to account for the additional stored water.

8-6 Second, we support the hybrid shoreline protection option outlined in Alternative 3 for its aesthetic and habitat benefits relative to traditional shoreline armoring. Perched beaches, anchored logs, and other techniques associated with the hybrid protection option will better blend in with the surrounding environment and likely provide minor habitat benefits relative to the traditional armoring proposed in Alternative 2.

Other comments include the following:

8-7
- Construction activities should be timed to avoid harming ESA-listed steelhead spawning below Cle Elum Dam; and

8-8
- Mitigation for the environmental impacts of shoreline protection should be provided through habitat improvements in the upper Cle Elum watershed where such improvements could benefit the fish species intended to benefit from the water provided by the pool raise.

8-9 Thank you for considering our comments. We look forward to the recovery of salmon, steelhead, and bull trout in the Cle Elum River system that the pool raise, combined with fish passage, will help make possible.

Sincerely,

Michael Garrity
Washington State Conservation Director
American Rivers

Lisa Pelly
Director, Washington Water Project
Trout Unlimited

Kitty Craig
Washington State Deputy Director
The Wilderness Society

Naturam Expellas Furca *Tamen Usque Recurret*

WISE USE MOVEMENT

P.O. Box 17804, Seattle, WA 98127

Received in Mailroom
C C O NOV 25 2014 Y F O
Yakima, Washington

VIA MAIL AND EMAIL

November 20, 2014

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia- Cascades Area Office
1917 March Road
Yakima, WA 98901-2058
cepr@usbr.gov

Dear Ms. McKinley:

The following are comments of the Wise Use Movement on the NEPA and SEPA Cle Elum Pool Raise Project Draft Environmental Impact Statement (DEIS), dated September 23, 2014.

GENERAL COMMENTS

9-1 Over the last 35 years since Congress passed the Yakima River Basin Water Enhancement Project bill in 1979, the Bureau of Reclamation and Department of Ecology have wasted millions of dollars on water storage study projects in the Yakima River Basin without constructing a single water project other than three reregulation reservoirs on the Sunnyside Valley Irrigation District.

In 1982, the BuRec and Ecology studied 35 dam sites in the Yakima Basin.
http://news.google.com/newspapers?nid=860&dat=19820728&id=-H5UAAAAIBAJ&sjid=Bo8DAAAAIBAJ&pg=5454,2159561

The BuRec's 1984 Damsite and Structure Review dam site study identified the following dam sites for additional feasibility studies:
- Bumping Lake Enlargement on the Bumping River
- Cle Elum Enlargement (Cle Elum River)
- Devil's Table on Rattlesnake Creek (alternative Mile 4 damsite)
- Forks Project on the Teanaway River
- Horsetail Project on Little Naches River
- Tieton Dam Enlargement on Tieton River
- Wymer Project on Lumuma Creek
- Status Project on Status Creek
- Simcoe Project on Simcoe Creek
- Tampico Project on Ahtanum Creek

while eliminating other potential dam sites:
- Bakeoven South Fork – Tieton River
- Casland North Fork - Teanaway River

- Cooper Lake – Cooper River
- Cowiche – South Fork Cowiche Creek
- Dog Lake - Clear Creek
- Hole in the Wall – Dry Creek
- Horseshoe Bend – Naches River
- Hyas Lake - Cle Elum River
- Little Rattler - Rattlesnake Creek
- Lost Meadow – Little Naches River
- Lower Canyon – Yakima River
- Manastash - Manastash Creek
- Mile Four - Rattlesnake Creek
- Minnie Meadows – South Fork Tieton River
- Naneum - Naneum Creek
- Pleasant Valley – American River
- Rattlesnake - Naches River
- Soda Springs – Bumping River
- Swauk – Swauk Creek
- 9-1 Toppenish – Toppenish Creek
- Upper Canyon – Yakima River
- Wapatox - Naches River
- Waptus Lake – Waptus River
- Wenas - Wenas Creek

http://www.usbr.gov/pn/programs/yrbwep/reports/phase2/damsitereview.pdf

Since then, more taxpayer money has been wasted on more storage dam sites:
- Cabin Creek Project
- Black Rock Project
- Burbank Project
- Selah Project

The Wise Use Movement continues to strongly oppose more irrigation storage dams in the Yakima River Basin when over 200,000 acres of water conservation remain to be carried out, and other alternatives such as aquifer storage and water banking need to be addressed.

The 1945 Federal Court Consent Decree established that the Total Water Supply Available (TWSA) be provided first to the senior irrigation districts with non-proratable water rights in case of a drought with anything left over to the junior irrigation districts with proratable water rights (while maintaining some base-line minimum fish flows). The Cle Elum DEIS says that when Congress authorized the Cle Elum project back in 1994, it removed the three-
9-2 foot raise acre-feet from the TWSA and allocated it to in-stream flows. The BuRec has failed to explain how the TWSA can be modified without amending the 1945 Federal Court Consent Decree.
* Does the BuRec and Ecology intend to amend the 1945 Federal Court Consent Decree to remove any additional storage at the Cle Elum reservoir from the TWSA?

The BuRec and Ecology's Scoping Summary Report for the Cle Elum Pool Raise Environmental Impact Statement, February 2014, is more notable for what it refuses to evaluate:

Surface Water Resources
Note: The EIS will not evaluate the water demands of agricultural commodities or identify all approved water conservation plans because these requests are not sufficiently related to the proposed action and its
9-3 *potential to cause significant impacts. p. 20.*

This is incorrect. Under Alts. 4 and 5, the BuRec would deliver an additional 14,600 acre-feet of water. The proratable water users that would benefit from an increase in water supply provided by this project include the Kittitas Reclamation District, Roza Irrigation District, Wapato Irrigation Project, and to a lesser extent, the Kennewick Irrigation District during a drought year. If these irrigation districts were to reduce their demand for

irrigation water by 14,600 acre-feet, Alts. 4 and 5 would not be necessary. Therefore, conservation plans are a viable alternative to the proposed project and must be considered.
9-3 * For each irrigation district, please provide:
- A description of the district
- The date of adoption and status of any water conservation plans developed by each district
- An inventory of water resources
- Best management practices in place
- The criteria for evaluating the adequacy of all water conservation plans developed

Socio-economic
Note: The EIS is not expected to provide a cost-per-acre-foot comparison between the proposed pool raise and water conservation; nor will the EIS develop a benefit and cost analysis. The EIS will not include a detailed quantitative analysis of jobs creation, effects on wage levels, local set-asides, or demand for local lodging during construction because this information is not necessary to understand and evaluate the
9-4 *potential for significant impacts. p. 22*

This is incorrect. Sec. 4.18.6.2 (p. 4-133) of the DEIS does provide a job creation summary in Table 4-36.
* Why are the BuRec and Ecology providing job creation figures in the DEIS, but refuses to provide a cost-per-acre-foot comparison between the proposed pool raise and water conservation?

Cumulative Effects
Note: The EIS will not reevaluate cumulative effects on the entire Yakima River basin associated with the Integrated Plan. These effects have been evaluated previously in the March 2012, Yakima River Basin
9-5 *Integrated Water Resource Management Plan Final Programmatic EIS. p. 22.*

The BuRec and Ecology insist that the proposed project is an integral part of the controversial Yakima Plan. The March 2012 FPEIS did not evaluate cumulative impacts at the project level.
* The DEIS must evaluate the cumulative effects of the proposed project, alternatives, and the other elements of the controversial Yakima Plan.

Alternatives
The EIS will not advance alternatives for detailed analysis in the EIS that do not satisfy or approximate this congressional authorization. Thus, water conservation, water marketing, alternative agriculture and cropping, aquifer storage, new forest designation and practices, and similar suggestions that were
9-6 *identified during scoping likely will not receive detailed assessment in the EIS. p. 23.*

This is incorrect. The BuRec and Ecology are willing to advance alternatives (Alts. 4 and 5) that do not satisfy or approximate the congressional authorization.
* Water conservation, water marketing, alternative agriculture and cropping, aquifer storage, new forest designation and practices are all alternatives to Alts. 4 and 5 and, therefore, must be analyzed in a detailed fashion.

More Specific DEIS Comments Are As Follows:

Section 1.4.1 (p. 1-3). Location and Setting
This section states that the Cle Elum Reservoir is the main source of water to meet the large irrigation demands in the lower Yakima River basin. The Cle Elum Reservoir has an active capacity of 436,900 acre feet. Kachess
9-7 Reservoir has an active capacity of 239,000 acre-feet and Keechelus Reservoir has an active capacity of 157,900 acre feet.
* If Cle Elum Reservoir has less than half the combined capacity of Kachess and Keechelus Reservoirs, how can it be the main source of irrigation demands in the lower Yakima River basin?

This section fails to disclose that, according to the BuRec's 1984 Damsite and Structure Review, considering the length of the glacial materials of over 100 feet at this dam, a potential for liquefaction may exist; that of particular
9-8 concern is the potential for seismic activity at the site and the performance of the dam and foundation under seismic loading and apparently, zones of potentially liquefiable materials are present in the foundation (pp. 29 and 30).
http://www.usbr.gov/pn/programs/yrbwep/reports/phase2/damsitereview.pdf

The DEIS contains no information on dam seismic failure, earthquakes, or seepage issues. This is disturbing given the past failures of the BuRec to properly account for dam failure (e.g., Teton Dam, Idaho in 1976).
* What is the current analysis of dam seismic failure, earthquakes, or seepage issues at the existing Cle Elum Dam and with a proposed three-foot raise?

9-8 Nor does the DEIS's References section include the BuRec's *Technical Service Center Technical Memorandum No. UX-8313-2, Geological and Geotechnical Analysis for the Modification Decision Analysis of the Cle Elum Dam* (February 2000).
http://www.usbr.gov/pn/programs/eis/cleelumraise/geo.pdf
* Why was this technical memorandum not addressed as part of this DEIS?
* Please summarize this memorandum, including its findings on voids within the existing dam.

9-9 This section fails to mention that the Cle Elum Reservoir watershed is within the Okanogan-Wenatchee National Forest.
* Please include this information in this section.

Section 1.6.1 and 1.6.2 (pp. 1-9 to 1-10). Tiering to the Integrated Plan PEIS and Documents Adopted under SEPA.

9-10 The Yakima Plan PEIS failed to comply with NEPA or SEPA by refusing to analyze any alternatives other than a pre-selected controversial Yakima Plan and a no-action alternative. The Cle Elum Pool Raise DEIS further compounds this failure by refusing to analyze reasonable alternatives.
* Neither the BuRec nor Ecology should adopt or incorporate by reference the Yakima Plan PEIS.

Section 1.8.2 (p. 1-11). Washington State Authorization

The section on Washington State Authorization is incomplete. Section 5057 of Engrossed Substitute Senate Bill 5035 (2013) was passed by a Washington Legislature concerned about the BuRec and Ecology manipulation of benefits values from the controversial Yakima Plan.

* Please add the following to Section 1.8.2:

> 9-11 "In 2013, the Washington State Legislature (Section 5057, ESSB 5035) required the Washington State Legislature's Water Research Center to prepare a separate benefit-cost analysis on Yakima Plan elements, including the Cle Elum Reservoir project, by December 15, 2014."

In addition, 40 CFR Sec. 1502.23 provides:

> "If a cost-benefit analysis relevant to the choice among environmentally different alternatives is being considered for the proposed action, it shall be incorporated by reference or appended to the statement as an aid in evaluating the environmental consequences."

* The Water Research Center's benefit-cost analysis should be appended to the DEIS.

Section 1.9.2 (p. 1-3). Fish and Wildlife Coordination Act

The Yakima River Basin Integrated Water Resource Management Plan Final Programmatic EIS (March 2012) states, "The programmatic EIS does not evaluate site-specific issues. . ." FPEIS Sec. 1.2 (p. 1-4). The FPEIS promised that impacts would be analyzed on each individual project. In Appendix F, however, the BuRec states that the FPEIS "is sufficient for future projects undertaken for the Integrated Plan, including Cle Elum Pool Raise. . . Separate [Fish and Wildlife Coordination Act] FWCA reports for these projects are not required."

Congress requires:

> 9-12 In furtherance of such purposes, the reports and recommendations of the Secretary of the Interior on the wildlife aspects of such projects, and any report of the head of the State agency exercising administration over the wildlife resources of the State, based on surveys and investigations conducted by the United States Fish and Wildlife Service and such State agency for the purpose of determining the possible damage to wildlife resources and for the purpose of determining means and measures that should be adopted to prevent the loss of or damage to such wildlife resources, as well as to provide concurrently for the development and improvement of such resources, shall be made an integral part of any report prepared or

> submitted by any agency of the Federal Government responsible for engineering surveys and construction of such projects when such reports are presented to the Congress or to any agency or person having the authority or the power, by administrative action or otherwise,
> (1) to authorize the construction of water-resource development projects or
> (2) to approve a report on the modification or supplementation of plans for previously authorized projects, to which sections 661 to 666c of this title apply. Recommendations of the Secretary of the Interior shall be as specific as is practicable with respect to features recommended for wildlife conservation and development, lands to be utilized or acquired for such purposes, the results expected, and shall describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for
> 9-12 these damages. The reporting officers in project reports of the Federal agencies shall give full consideration to the report and recommendations of the Secretary of the Interior and to any report of the State agency on the wildlife aspects of such projects, and the project plan shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits. *16 U.S. Code § 662(b) Reports and recommendations; consideration.*

The Final Fish and Wildlife Coordination Act Report on the programmatic Yakima Plan, dated February 10, 2012, contains no recommendations on the wildlife aspects of the Cle Elum Pool Raise project and, therefore, the general FWCA Report prepared for the programmatic Yakima Plan is completely inadequate as a response to the Cle Elum Pool Raise Project.
* The BuRec should comply with the FWCA and consult with the USFWS on the Cle Elum Pool Raise Project.

Sec. 2.3 (p. 2-3). Alternate 1 – No Action Alternative

9-13 This section makes passive reference to the Cle Elum Dam Fish Passage Facilities project.
* Please provide a clearer analysis under the various alternatives as to the impacts of the pool raise project to the fish passage project.

9-14 * Regarding Figure 2-3, please provide a different contrast in colors between the 2240 and 2243 elevation contours as the blue and green used is not distinguishable. If necessary provide large scale maps, especially for the upper reservoir.

9-15 **Sec. 2.4.2 (p. 2-16). Additional Stored Water for In-stream Flows.** This section states that "Section 4.2.3.1 provides more information about flow releases." There is no Section 4.2.3.1.
* Please correct this.

Alt. 2

Sec. 2.4.3.2 (p. 2-19). Rock "Shoreline Hardening" Construction Activities

The Corps of Engineers is well known for using "weasel words." It is unfortunate that the BuRec and Ecology are using the same methods. Please replace "Shoreline Protection," with "Shoreline Hardening." Rock riprap, rock walls or gabion baskets do not "protect" the biological functions of the shoreline. They destroy and harden the
9-16 shoreline. Approximately 16,900 feet of "shoreline hardening" for private shoreline properties listed in Table 2-3 (page 2-17) is proposed under Alt. 2. However, Table 2-4 provides clear and grub in acres; cut, fill and riprap as cubic yards, and geotextile as square yards.
* Please revise Table 2-3 and Figure 2-8 to clarify the location and length of stabilization with each type of proposed "shoreline hardening."

Sec. 2.4.3.4 (p. 2-20). Land Acquisition

9-17 This section states that BuRec would only acquire land or easements for shoreline hardening from willing sellers.
* Does this mean that the BuRec would not use eminent domain to acquire these private lands?

Sec. 2.4.3.5 (p. 2-20). Maintenance of Rock Shoreline Protection.

9-18 This section states that maintenance would include spraying.
* Please identify the type of herbicides that would be used and the likely maximum quantity of herbicides that could be expected to be used annually and over the life of the project.

9-19 **Sec. 2.4.5.2 (p. 2-25). Cle Elum River Campground**
* What specific impacts would the proposed Cle Elum pool raise have on the Cle Elum River Campground?

Alt. 3

9-20 **Sec. 2.5.3.3 (p. 2-31). Hybrid Shoreline Protection Construction Approaches.** This section is more helpful in identifying the hybrid shoreline approaches by read and type. However, it is difficult, if not impossible to compare the shoreline impacts from Alt. 2 and Alt. 3 by site.
* Please rewrite Alt. 2 and Alt. 3 and Table 2-7 with a side by side table of each shoreline site by reach and the proposed construction approaches for each.

Alt. 4

9-21 **Secs. 2.6 and 2.7 (pp. 2-34 to 2-38). Additional Stored Water Used for TWSA alternatives**
The BuRec and Ecology cannot have it both ways. The BuRec and Ecology cannot refuse to consider alternatives to the three-foot pool raise (such as groundwater storage, water conservation, deeper access of the Kachess dead water pool, or a Cle Elum pool raise of one or two feet) because Congress authorized a Cle Elum Pool Raise project and allocated a certain amount of water in 1994, and then propose two new alternatives that the BuRec and Ecology cannot carry out without further action by Congress.

9-22 **Sec. 2.6.2 and 2.7.2 (pp. 2-35 and 2-27). Additional Stored Water Used for TWSA.**
* The BuRec and Ecology should clarify the following:
  - Under Alts. 4 and 5, the BuRec would carry over additional stored water from year to year until a drought occurs. How, exactly, would Cle Elum stored water be "carried over?" Assuming a winter/spring that fills all reservoirs, is the BuRec proposing that the Cle Elum reservoir would be drained 14,600 acre-feet less, to help carry this water over to the next growing season?
  - Under Alts. 4 and 5, if the reservoir does not fill due to insufficient runoff, how does the three-foot raise provide any additional water for TWSA?
  - Section 4.2.4.1 (p. 4-4) states that for Alt. 2, "In drought years, the reservoir would not fill to elevation 2,240, so no additional storage would occur and the reservoir fluctuation would remain the same as existing." If, in a drought year, the Cle Elum reservoir would not fill and no additional storage would occur, how would additional water be provided to proratable irrigation districts under Alts. 4 and 5?

9-23 Sec. 4.2.6.3 states that the proratable water users that would benefit from an increase in water supply provided by this project include the Kittitas Reclamation District, Roza Irrigation District, Wapato Irrigation Project, and to a lesser extent, the Kennewick Irrigation District.
* What specific allocations would each of these four Irrigations receive from an additional 14,600 acre feet?

9-24 **Sec. 2.9.1 (p. 2-39). Inactive Storage Proposals**
It is interesting that the BuRec rejected constructing a tunnel to access inactive storage in the Cle Elum Reservoir on the basis of cost alone.
* Wouldn't this alternative have less environmental shoreline impacts than the proposed three-foot raise?
* Please evaluate the environmental impacts of accessing 14,500 acre feet of inactive storage in the Cle Elum Reservoir access.

9-25 **Sec. 2.9.2 (p. 2-39). Increased Storage Proposals**
Raising the Cle Elum Reservoir by one or two feet would have less damaging shoreline impacts than raising the Cle Elum Reservoir by three feet. Please evaluate the environmental impacts of a one, as well as two feet raise.

9-26 **Sec. 3.2.2 (p. 3-8). Cle Elm Dam and Reservoir Operations**
This section states that the greatest volume of water released from Cle Elum Reservoir occurs in July and August to meet most of the lower Yakima River basin irrigation demands and that in September the BuRec reduces the July and August median release of 2,863 cfs from the Cle Elum Reservoir to a minimum flow range of 180 to 300 cfs.
* What would be the optimum in-stream flows for fishery resources in the Cle Elum River?
* What prohibits the BuRec from releasing these optimum in-stream flows?

9-27 **Sec. 3.4.1.2 (p. 3-16). State Water Quality Assessment and 303(d) List**
This section states that the State's 303(d) list includes the Cle Elum River is listed for water temperature (Category 5) for reservoir inflow and outflow and (Category 2) for temperature father downstream and upstream at the outlet.

9-27 Cliff Mass, University of Washington professor of climatology, in a presentation to the Yakima Rotary, October 23, 2014, predicted that due to climate change our mountains will get more rain and less snow. This would also increase water temperature for reservoir inflow and outflow. Increasing the storage of Cle Elum Reservoir would increase the volume of higher temperature water released to the Cle Elum River.
* What impact to fish and wildlife would such higher river water temperatures have?
* Did the Fish and Wildlife Coordination Report for the FPEIS address this?

Sec. 3.4.1.4 (p. 3-17). Washington State Antidegradation Policy
9-28 * The BuRec and Ecology should quantify the degree of temperature increase caused by raising Cle Elum Reservoir, or the BuRec or Ecology's estimates of temperature increase in Cle Elum Reservoir or the Cle Elum River from increased rainfall and decreased snowpack.

9-29 **Sec. 3.4.4.2 (p. 3-21). Downstream from the Reservoir**
This section states that during spring, BuRec may release water from the spillway gates (reservoir surface) into the Cle Elum River with minimal impacts from increased temperature and that releases from the spillway during July and August do not occur.
* Under Alts. 4 and 5, which propose releases for irrigation during drought years, when would releases take place?

9-30 **Sec. 3.5.2 (p. 3-24). Onsite Septic Systems**
This section states that up to 14 OSS are on parcels that could be inundated. This section fails to disclose the elevation of these OSSs.
* How much closer to the water table would each of these OSSs be with the proposed three-foot pool raise?

9-31 **Sec. 3.6.1 (p. 3-26). Resident Fish**
This section states that the Cle Elum Reservoir is an unproductive environment with low nutrient levels, chlorophyll a concentrations, phytoplankton biovolume, and zooplankton densities.
* How will this unproductive environment be made more unproductive by the shoreline hardening measures proposed under Alts. 2 through 5?

9-32 **Sec. 3.6.2.1 (p. 3-31). Sockeye**
This section does not fully describe the current truck and haul upstream passage over the existing Cle Elum dam.
* When would sockeye returns be large enough to stop trapping sockeye from Priest Rapids Dam?
* How would sockeye be expected to survive in such a nutrient poor reservoir with additional shoreline hardening?

9-33 **Sec. 3.7.2 (p. 3-35). Wetlands**
This section states that the BuRec used the National Wetland Inventory (NWI) to identify wetlands in the study area and that the NWI mapped approximately two acres of palustrine wetlands in the higher reservoir level that would be inundated. While the NWI can provide approximate inventories, it cannot substitute for a wetland delineation by a professional wetland scientist.
* Please have the Cle Elum shoreline wetlands delineated by a professional wetland scientist.
* What mitigation is proposed for the loss of the two acres of palustrine wetlands from inundation?

Sec. 3.9 Federal Threatened and Endangered Species

9-34 **Sec. 3.9.1 (p. 3-39). Bull Trout**
This section states that bull trout require cold, clear water.
* What is the BuRec or Ecology's estimates of temperature increase in Cle Elum Reservoir or the Cle Elum River from increased rainfall and decreased snowpack and impacts on bull trout?

9-35 **Sec. 3.12 (p. 3-50). Climate Change**
This section states that under the Adverse climate change scenario, the enlarged storage capacity provided by the Cle Elum Pool Raise Project would be available LESS often. Sec. 3.12.1.2 states that "The model predicts the existing reservoir to be 16 feet lower, on average, under the Adverse climate change scenario."
* If this might be the case, why didn't the BuRec and Ecology carry forward the alternative of accessing the dead-storage water in the Cle Elum Reservoir?

9-36 * Please revise Table 2-2, to reflect the range of dates of expected periods of additional inundation for the Pool Raise Project based on the Adverse scenario.

9-36 * Why would the BuRec and Ecology promote a project to raise the reservoir, if the existing reservoir would be 16 feet lower, on average, under the Adverse scenario?

Sec. 3.14 (p. 3-57). Recreation

9-37 This section states that off-highway vehicle (OHV) use increases as mud flats develop, but that the United States Forest Service (USFS) restricts OHV use on the lakebed to ingress and egress to the shoreline and does not allow it at all in some areas and that the USFS prohibits recreational use of OHVs around the lakebed.
* Please clarify this section as to whether OHV use is allowed on the lakebed and mudflats, what is meant by "ingress and egress to the shoreline," and how many tickets the USFS has issued in 2013 and 2014 for any OHV violations in this area.

9-38 * Please revise Figure 3-6 to include a line showing the proposed 2,243-foot Elevation Contour.

Sec. 3.15. Land and Shoreline Use

Sec. 3.15.1.3 (p. 3-63). Wenatchee National Forest Plan

9-39 This section complete fails to provide the reader any information of land management practices on the Okanogan-Wenatchee National Forest Plan or how such practices result in reduced snow pack within the watershed.
* What snow pack reduction in the Cle Elum watershed is attributable to timber harvest activities?
* What is the acreage and percentage of the Cle Elum watershed within the Okanogan-Wenatchee National Forest that has been timber harvested?
* What is the acreage and percentage that has not been replanted?
* What steps are the USFS taking to retain snow pack in the Cle Elum watershed?

Sec. 3.15.3 (p. 3-64). Local Land Use Planning

9-40 * Please provide a map showing the local land use planning zoning for the surrounding area.
* Please revise Figure 3-7 to include a line showing the proposed 2,243-foot Elevation Contour.

Sec. 3.15.3.2 (p. 3-65). Shoreline Management

9-41 The State Shoreline Management Act consists of an Ecology approved local control shoreline master programs (SMP). Cle Elum Reservoir is a lake of Statewide Significance. RCW 90.58.020 provides:

"*The legislature declares that the interest of all of the people shall be paramount in the management of shorelines of statewide significance. The department, in adopting guidelines for shorelines of statewide significance, and local government, in developing master programs for shorelines of statewide significance, shall give preference to uses in the following order of preference which:*
(1) Recognize and protect the statewide interest over local interest;
(2) Preserve the natural character of the shoreline;
(3) Result in long term over short term benefit;
(4) Protect the resources and ecology of the shoreline;
(5) Increase public access to publicly owned areas of the shorelines;
(6) Increase recreational opportunities for the public in the shoreline;
(7) Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary."

The EIS should explain:
* How does 16,900 feet of shoreline modification, including 192,000 cubic yards of cut, 53,000 cubic yards of fill, and 45,000 cubic yards of riprap (Alts. 2 and 4) protect the statewide interest over local interest, especially if additional storage water is diverted to local irrigation (Alts. 4 and 5)?
* How does 16,900 feet of shoreline modification, including 192,000 cubic yards of cut, 53,000 cubic yards of fill, and 45,000 cubic yards of riprap (Alts. 2 and 4) preserve the natural character of the shoreline?
* How does 16,900 feet of shoreline modification, including 192,000 cubic yards of cut, 53,000 cubic yards of fill, and 45,000 cubic yards of riprap (Alt. 2) protect the resources and ecology of the shoreline?

Under the current Kittitas SMP, much of the shoreline of Cle Elum Reservoir and the Cle Elum River is within a Conservancy shoreline environment. The intent of this designation is to sustain natural resource development while maintaining the natural character of the shoreline area. Under the current SMP shoreline "works" are only allowed where they "do not substantially change the character of the environment." The proposed shoreline hardening would substantially change the character of the shoreline environment. Under the proposed amended SMP the majority of the Cle Elum Reservoir would be designated Rural Conservancy and the portion of the southeastern side

9-41 of the reservoir in private ownership designated Shoreline Residential, allowing shoreline hardening as a conditional use.

9-42 WAC 173-26-251(2) provides:

Second, the Shoreline Management Act calls for a higher level of effort in implementing its objectives on shorelines of statewide significance. RCW 90.58.090(5) states:
"The department shall approve those segments of the master program relating to shorelines of statewide significance only after determining the program provides the optimum implementation of the policy of this chapter to satisfy the statewide interest."

Kittitas County has proposed to amend its Shoreline Master Program to provide less protection to the Cle Elum Reservoir as a lake/shoreline of statewide significance.
* How would providing less protection satisfy the statewide interest?

Sec. 3.17 (p. 3-66). Transportation

9-43 * Please revise Figure 3-8 to include a line showing the proposed 2,243-foot Elevation Contour.

Sec. 4.2.3 (p. 4-3). Alternative 1 – No Action Alternative

9-44 Addressing the demands of proratable irrigators was NOT the purpose of PL 103-434).
* Please delete "or proratable irrigators" from the first sentence of the last paragraph on this page.

Section 4.2.4.1 (p. 4-4). Alt 2 – Spillway Radial Gate Modifications to Raise the Reservoir Level

9-45 This section states that the high and low water levels would increase by the amount of additional storage captured and that the difference would be three feet at full pool "and about 5 feet at lower reservoir levels when the reservoir is drawn down."
* Please clarify this statement. How would the reservoir be five feet at lower reservoir levels when the reservoir is drawn down? Is this the carry over storage level mentioned in Sec. 4.2.4.2? Wouldn't the reservoir be drawn down to its current level even with a three-foot pool raise?

9-46 This section states that the Cle Elum Reservoir would exceed the current elevation level of 2,240 feet about 72 percent of the years modeled and the 2,243 feet 52 percent of the years modeled.
* How often would a two-foot pool raise exceed the 2,242 foot elevation?

Sec. 4.2.4.2 (p. 4-6). Water Used for In-stream Flow

9-47 This section states that the primary benefit of increased winter in-stream flows would be for salmonid overwintering habitat in the Cle Elum River. However, neither this section nor Section 3.6.2 (p. 3-31) Anadromous Fish specifically quantifies salmonid overwintering habitat or the net increase in anadromous fish in the Cle Elum River from the proposed pool raise alone. Instead, Section 3.6.2 states that that the Yakama Nation trap and transport mixed Wenatchee and Lake Osoyoos stocks of sockeye salmon from Priest Rapids Dam to Cle Elum Reservoir; releases 500,000 spring fry and summer parr coho in habitats upstream of Cle Elum Reservoir; and collects returning spring Chinook at Roza Dam and transports them to Cle Elum Reservoir.
* What is the net increase in anadromous fish in the Cle Elum Reservoir and the Cle Elum River from the proposed pool raise alone?

9-48 * Will the trap and haul activities decrease, increase or stay the same under Alt. 2?

9-49 * What species of salmonids would benefit from increased winter in-stream flows in the Cle Elum River?

9-50 * How would Alt. 2 benefit Pacific lamprey?

Alt. 4

Sec. 4.2.6.2 (p. 4-9). Increased Reservoir Pool

9-51 * Would the use of the additional three foot pool raise for irrigation mean that the reservoir would be drained down to its current level during a drought year with no carry over?

Sec. 4.2.6.3 (p. 4-11). Additional Stored Water Used for TWSA

9-52 Table 4-4 contains "September 30 Prorationing Level" for Water Years 1992, 1993, and 1994, with 1994 figures reported as 26.3 percent.
* Please provide references for these figures.

9-53 The prorationed irrigation districts have experienced three successive drought water years (1992, 1993, and 1994) below 70 percent of water supply with the third year water supply at 26.3 percent.
* Please provide alternative analysis that includes a 60 percent and 50 percent water supply availability for prorationed irrigation districts.

Sec. 4.3

Figure 4-5 (p. 4-22). Proposed Shoreline Mitigation Areas and Habitat Improvement Areas

9-54 * Please revise Figure 3-8 to include a line showing the proposed 2,243-foot Elevation Contour.

Sec. 4.4.4.2 (p. 4-28). Additional Stored Water Used for In-stream Flow

9-55 While this section does predict a 0.6 degree (F) increase in water temperatures in the Cle Elum River, it does not quantify the increase in temperature from climate change that may result from less snowpack in the Cle Elum River Basin.
* Please provide an analysis of Cle Elum Reservoir and Cle River temperatures from the BuRec's Adverse climate change scenario.

Sec. 4.6.3 (p. 4-41). Alternative 1 – No Action Alternative

9-56 This section states that under the no-action alternative, fish survival and productivity in the Cle Elum River would remain relatively low. The Cle Elum Dam Fish Passage Facilities project is a separate element of the controversial Yakima Plan.
* Please provide additional information as to the quantification of salmon species improvements from the Cle Elum Dam Fish Passage Facilities alone, the pool raise project alone, and the combination of both these projects.

Alt. 2

Sec. 4.7.4.1 (p. 4-48), Spillway Radial Gate Modification to Raise the Reservoir Levels

9-57 This section states that no significant changes to wetland communities around the Cle Elum Reservoir. The proposed Alt. 2 would inundate an additional 46 acres of wetland/vegetation communities. Drawing down the reservoir would then turn these 46 acres back into "upland" dry communities.
* What is the expected wetland and wildlife community loss from this 46 acre transition?

9-58 This section states that approximately 30 acres of coniferous forest, 11 acres of deciduous trees and scrubs , and 0.1 acres of herbaceous vegetation would be inundated by the project. Sec. 4.7.8 (p. 4-55) Mitigation Measures, is far too general to provide decisionmakers with any real information.
* What specific mitigation does BuRec and Ecology propose for this loss?

Sec. 4.9. Threatened and Endangered Species

Sec. 4.9.2 (p. 4-65). Summary of Impacts

9-59 This section states that "The No-Action Alternative would result in continuation of current conditions, which could result in detrimental long-term impacts to listed species in the Cle Elum and upper Yakima rivers." This is incorrect. The controversial Yakima Plan consists of elements that have already been authorized by Congress (such as the Cle Elum Pool Raise) and the Cle Elum Fish Passage project, for which the BuRec already completed a Record of Decision in August 2011. * Please delete this sentence.

9-60 * Please amend this section to clarify that irrigation withdrawals, together with forest harvest and road construction, as well as ORV abuse continue to be actions that continue to have detrimental long-term impacts to listed species in the Cle Elum and upper Yakima Rivers.

Sec. 4.9.4.2 (p. 4-68). Additional Storage Water Used for In-stream Flow - Operation

9-61 This section states that there is no evidence that bull trout spawn below Cle Elum Dam.
* Please identify all side channel or off-channel habitat for bull trout that would be improved by operation of additional stored water for in-stream flows.

Sec. 4.9.4.3 (p. 4-70). Rock Shoreline Protection - Operation

9-62 This section states that shoreline "protection may" permanently replace wildlife habitats. . ."
* Please amend this section to state that "shoreline hardening will permanently replace wildlife habitats, such as areas of conifer forest and deciduous shrub communities, with rock embankment."

Sec. 4.12.4 (p. 4-90). Alternative 2- Additional Stored Water Used for In-stream Flow and Rock Shoreline "Protection"

9-63 This section states that ". . .the project would have small, positive impact. . . on the ability of. . .the agricultural sector of the economy. . .to better withstand and adapt to changing conditions. . ."
* Please amend this section to delete the reference to "the agricultural sector of the economy," as, under Alt. 2, the BuRec claims that all stored water would be allocated to in-stream flow, not to irrigation districts.

Section 4.18.4.2 (p. 4-129). Use of Additional Stored Water for In-stream Flow

9-64 This section states that "The additional water stored for in-stream flow would have a minor unquantified beneficial effects on fish populations. The additional water would increase the areas suitable for rearing during dry years. This might possibly increase recreational or commercial fishing activity. However, data are not available that quantify this impact resulting from potential improvements in fish populations." The BuRec has studied the Yakima Basin and spent hundreds of millions of dollars on consultant reports and engineering and environmental studies over the past half-century.
* What explains the lack of data regarding recreational or commercial fishing activities?
* What are the current conditions for such activities?

9-65 * How much additional area would be available for rearing during dry years and for which species?

9-66 * How could addition water increase areas suitable for rearing during dry years if the Cle Elem Reservoir did not fill above elevation 2,240 feet?

Sec. 4.18.6.2 (p. 4-133). Use of Additional Stored Water for TWSA – Changes in Agricultural Production

9-67 This section estimates that $10,243,000 of agricultural production benefits would accrue to the State of Washington (Table 4-36). The BuRec/Ecology's "Four Accounts Analysis of the Integrated Plan," dated September 26, 2012, estimated fish-related benefits to both WA and OR of over $7 billion.
* If the BuRec and Ecology intend to count fish-related benefits to all the residents of Oregon, what additional agricultural production benefits would accrue to the State of Oregon?

9-68 * If the BuRec and Ecology estimates that $10 million of agricultural benefits would accrue due to 16,400 acre feet of additional storage, would these same benefits also accrue if Yakima irrigation districts were 16,400 acre feet more efficient with their existing water deliveries?

9-69 This section states that ". . .that Reclamation allocates the water to only the most efficient and highest value uses" during severe drought conditions.
* Please explain how the Bureau does this.

9-70 * How does each prorateable irrigation district distribute water during a drought year?

Sec. 4.22. Environmental Justice

Sec. 4.22.2 (p. 4-143). Summary of Impacts

9-71 This section states that the No-Action alternative could reduce opportunities for subsistence fishing, associated with reduced in-stream flows in the Cle Elum River. As noted, above, the BuRec and Ecology have no data concerning recreational or commercial fishing activity.
* If the BuRec and Ecology have no data concerning recreational or commercial fishing activity (Sec. 4.18.4.2), what quantitative subsistent fishing data does the BuRec or Ecology have?

Sec. 4.23 (p. 4-145). Relationship of the Pool Raise Project to the Integrated Plan

9-72 This section states that the Pool Raise Project is an important component of the controversial Integrated Plan. . ." This is incorrect.
* Please revise this section to clarify that the Pool Raise Project was authorized by Congress in 1994 and is a separate project that can be implemented, whether any other element of the controversial Yakima Plan is carried out.

9-73 * Please revise this section clarify the quantitative changes to fishery resources that would occur 1) with the Cle Elum Pool Raise Project and the Cle Elum Fish Passage Project
2) with just the Cle Elum Pool Raise Project
3) with just the Cle Elum Fish Passage Project.

Sec. 4.24. Cumulative Impacts

Sec. 4.24.1.1 (p. 4-146). Land Use Practices

9-74 This section complete fails to provide the reader any information of past land management practices on the Okanogan-Wenatchee National Forest Plan or how such practices result in reduced snow pack within the Cle Elum watershed.

* What has been the historical yearly water yield off the Okanogan-Wenatchee National Forest in the Cle Elum watershed?
* How many miles of roads have been constructed within the Okanogan-Wenatchee National Forest's Cle Elum watershed?
* What are the current off-road vehicle policies within the Okanogan-Wenatchee National Forest's Cle Elum watershed?

Sec. 4.24.1.2 (p. 4-146). Water Management Practices

9-75 This section states that "Past water management actions have caused cumulative impacts at the Cle Elum Reservoir area that have affected surface water, fish, vegetation, wildlife, and cultural resources." These are weasel words.

* Please amend this sentence to add, "have cause extreme and significant adverse cumulative impacts at the Cle Elum Reservoir area that have adversely affected . . ."

Sec. 4.24.3 (p. 4-147). Reasonably Foreseeable Future Actions

9-76 This section complete fails to provide the reader any information of proposed land management practices on the Okanogan-Wenatchee National Forest Plan or how such practices result in reduced snow pack within the Cle Elum watershed.

* What impacts to the Cle Elum watershed would occur under the Proposed Action for Forest Plan Revision, released by the USFS in June 2011?

Sec. 4.24.3.2 (p. 4-149). Potential Cumulative Impacts

9-77 This section states that the Cle Elum Dam Fish Passage Facilities Project would install upstream and downstream fish passage facilities for juvenile and adult salmonids.

* Where else has the BuRec successfully provided downstream fish passage in a reservoir with such extreme seasonal elevation changes?
* Please revise this section clarify the environmental impacts that would occur
1) with the Cle Elum Pool Raise Project and the Cle Elum Fish Passage Project
2) with just the Cle Elum Pool Raise Project
3) with just the Cle Elum Fish Passage Project.

Sec. 4.24.4 (p. 4-151). Cumulative Impacts Summary

9-78 This section is completely inadequate.

The CEQ regulations (40 CFR §§ 1500 -1508) define the impacts and effects that must be addressed and considered by Federal agencies in satisfying the requirements of the NEPA process. This includes cumulative impacts:

> ***Cumulative impact*** *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. 40 CFR § 1508.7. (emphasis added)*

The Cle Elum Pool Raise Project is designated a "component" of the Yakima River Basin Integrated Water Resource Management Plan. The Yakima River Basin Integrated Water Resource Management Plan EIS stated, "The programmatic EIS does not evaluate site-specific issues. . ." *FPEIS Sec. 1.2.* This is the first project-specific EIS prepared as part of the controversial Yakima Plan. Alts. 2 and 3 purport to provide additional storage water to modify Cle Elum River in-stream flows, while Alts. 4 and 5 purport to provide additional storage water for irrigators.

* As required by Sec. 1508.7, the EIS must analyze the cumulative impacts from other actions taken that would modify in-stream flows and other actions that would increase storage water for irrigators.

CONCLUSION

9-79 In conclusion, the DEIS is inadequate because it is based on a Final Programmatic EIS that failed to provide alternatives, and added environmental damaging elements (National Recreation Areas for off-road vehicle use) after the close of comments on the Draft Programmatic EIS.

9-80 The DEIS is inadequate because it also fails to provide alternatives to providing the additional storage water to irrigation districts with a Congressional amendment or explain how any additional storage water can be allocated to in-stream flows without amending the 1945 Federal Court Consent Decree.

9-81 Because both the NEPA and SEPA process must be followed, we request that the BuRec and Ecology each provide separate responses to the above comments.

9-82 Please send us a copy any FEIS that is released.

Sincerely,

John de Yonge

John de Yonge
President
540 Main St, Apartment 5C
Chatham NJ 07928
jdeyonge@gmail.com

ALPINE LAKES protection society

November 25, 2014

Submitted via email to ***cepr@usbr.gov***

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation / Columbia-Cascades Area Office
1917 March Road
Yakima, WA
98901-2058

RE: **Cle Elum Pool Raise Project DEIS**

Dear Ms. McKinley:

10-1 Alpine Lakes Protection Society (ALPS) submits these comments on the Cle Elum Pool Raise Project Draft Environmental Impact Statement (DEIS), dated September 23, 2014. These comments are submitted under both NEPA and SEPA.

10-2 The project needs to provide mitigation for the loss of the acres of wildlife habitat that would be inundated by the pool raise. Most of the acreage proposed to be flooded is healthy riparian habitat on National Forest lands. Under DEIS Alternatives 2 through 5, the three-foot rise in the lake level "would inundate approximately 30 acres of coniferous forest, 11 acre of deciduous tree and shrub, and 0.1 acres of herbaceous vegetation between 2,240 feet and 2,243 feet," (pp. 4-49 and 4-50) and includes "2 acres of palustrine wetlands in the area that the higher reservoir level would inundate," (p. 3-36). There needs to be acquisition of equivalent or better acreage and quality of habitat elsewhere.

10-3 The DEIS states that the proposed project is an integral part of the Yakima Plan. The Yakima Plan's March 2012 Final Programmatic EIS (FPEIS) did not evaluate cumulative impacts at the project level. Consequently, now that we are at the project level, the Cle Elum Pool Raise DEIS must evaluate the cumulative impacts of the proposed project in combination with the other elements of the Yakima Plan. This includes, but is not limited to, water demand and water conservation alternatives. Please provide a cost-per-acre-foot comparison between the proposed pool raise and water conservation. In addition, aquifer storage, water marketing, alternative agriculture and cropping, are reasonable alternatives that must be analyzed in detail as part of this DEIS.

10-4 The DEIS discusses tiering to the Yakima Plan FPEIS and documents adopted under SEPA (DEIS sections 1.6.1 and 1.6.2; pp. 1-9 to 1-10). However, the Yakima Plan FPEIS included only two alternatives (the Yakima Workgroup's Yakima Plan and a no-action alternative), when both NEPA and SEPA require an analysis of reasonable alternatives. Neither BuRec nor Ecology should adopt or incorporate by reference the Yakima Plan FPEIS because of the lack of reasonable alternatives presented for analysis in the Yakima Plan FPEIS.

10-5 BuRec should comply with the Fish and Wildlife Coordination Act and consult with the U.S. Fish and Wildlife Service on the Cle Elum Pool Raise Project.

10-6 As discussed in DEIS section 2.6.2. (p. 2-35), a 1945 federal court Consent Decree defined the Total Water Supply Available (TWSA) as follows:

> That amount of water available in any year from natural flow of the Yakima River, and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources, to supply the contract obligations of the United States to deliver water and to supply claimed rights to the use of water on the Yakima River and its tributaries, heretofore recognized by the United States.

The TWSA is made available to irrigation districts with non-proratable water rights, and any remainder during a drought year to proratable irrigation districts, while providing in-stream flow targets for fish. Under P.L.103-434, Sec. 1205(b) (see DEIS p. 1-2), in 1994 Congress allocated the Cle Elum Pool Raise Project water to in-stream flows, not irrigation. However, DEIS Alternatives 4 and 5 erroneously allocate additional storage water to irrigation, while failing to explain how the additional storage water can be legally allocated that way. Do BuRec and Ecology intend to seek Congressional action and/or amend the Consent Decree to allow any additional storage at the Cle Elum reservoir to be allocated to irrigation rather than in-stream flows?

10-7 ALPS supports the proposed Wild & Scenic River designations for the Cle Elum River and the Waptus River.

10-8 ALPS supports the proposed use of logjams and side channels in the Cle Elum River to enhance fish habitat quality.

10-9 ALPS supports providing resources to the US Forest Service to monitor the area for sockeye poaching, and to provide education to the surrounding community.

10-10 ALPS supports funding for acquisition of water rights from users downstream of the Cle Elum dam.

10-11 DEIS Table ES 2 shows 195,000 CY of excavation; where is this material going?

10-12 DEIS environmental commitments include installing shoreline protection in locations on the west side of Cle Elum Reservoir to mitigate for erosion impacts; what is this "protection"?

10-13 In addition to this Cle Elum project, the Bureau of Reclamation and Department of Ecology are also preparing environmental impact statements and State Legislation-mandated cost-benefit analyses on related projects for Lake Kachess inactive storage, and the Keechelus-to-Kachess Pipeline.

10-14 ALPS does support funding for fish passage to help restore salmon to the Yakima River Basin. However, we do not support the overall Yakima Plan as proposed, and we remain opposed to funding the expansion of Bumping Lake and Wymer dams. The public is awaiting results of a cost-benefit study of these two storage projects, mandated by 2013 state legislation. The public and decision-makers deserve to know the full economic and environmental consequences of funding all of these

10-14 storage projects. The Washington State Water Research Center's cost-benefit analysis should be appended to the DEIS.

10-15 Because both the NEPA and SEPA process must be followed, we request that the BuRec and Ecology each provide separate responses to the above comments.

10-16 In summary, while we support elements of the Cle Elum Pool Raise Project DEIS, this DEIS is inadequate because it is based on the Yakima Plan Final Programmatic EIS that failed to provide reasonable alternatives, and added environmental damaging elements (NRAs promoting off-road vehicle use) after the close of comments on the Draft Programmatic EIS.

10-17 Please send us a copy any Final EIS and Record of Decision that is released.

Thank you for considering these comments.

Sincerely,

ALPINE LAKES PROTECTION SOCIETY

Rick McGuire, President

By default the Alpine Lakes are here...by design they will remain.

NORTH CASCADES CONSERVATION COUNCIL
Founded in 1957
P.O. Box 95980, University Station
Seattle, WA 98145-1980

November 25, 2014

Submitted via email to ***cepr@usbr.gov***

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation / Columbia-Cascades Area Office
1917 March Road
Yakima, WA
98901-2058

RE: **Cle Elum Pool Raise Project DEIS**

Dear Ms. McKinley:

11-1 North Cascades Conservation Council submits these comments on the Cle Elum Pool Raise Project Draft Environmental Impact Statement (DEIS), dated September 23, 2014. These comments are submitted under both NEPA and SEPA.

11-2 The project needs to provide mitigation for the loss of the acres of wildlife habitat that would be inundated by the pool raise. Most of the acreage proposed to be flooded is healthy riparian habitat on National Forest lands. Under DEIS Alternatives 2 through 5, the three-foot rise in the lake level "would inundate approximately 30 acres of coniferous forest, 11 acre of deciduous tree and shrub, and 0.1 acres of herbaceous vegetation between 2,240 feet and 2,243 feet," (pp. 4-49 and 4-50) and includes "2 acres of palustrine wetlands in the area that the higher reservoir level would inundate," (p. 3-36). There needs to be acquisition of equivalent or better acreage and quality of habitat elsewhere.

The DEIS states that the proposed project is an integral part of the Yakima Plan. The Yakima Plan's March 2012 Final Programmatic EIS (FPEIS) did not evaluate cumulative impacts at the project level. Consequently, now that we are at the project level, the Cle Elum Pool Raise DEIS must evaluate the cumulative impacts of the proposed project in combination with the other elements of the Yakima Plan. This includes, but is not limited to, water demand and water conservation alternatives. Please provide a cost-per-acre-foot comparison between the proposed pool raise and water conservation. In addition, aquifer storage, water marketing, alternative agriculture and cropping, are reasonable alternatives that must be analyzed in detail as part of this DEIS.

The DEIS discusses tiering to the Yakima Plan FPEIS and documents adopted under SEPA (DEIS sections 1.6.1 and 1.6.2; pp. 1-9 to 1-10). However, the Yakima Plan FPEIS included only two alternatives (the Yakima Workgroup's Yakima Plan and a no-action alternative), when both NEPA and SEPA require an analysis of reasonable alternatives. Neither BuRec nor Ecology should adopt or incorporate by reference the Yakima Plan FPEIS because of the lack of reasonable alternatives presented for analysis in the Yakima Plan FPEIS.

BuRec should comply with the Fish and Wildlife Coordination Act and consult with the U.S. Fish and Wildlife Service on the Cle Elum Pool Raise Project.

As discussed in DEIS section 2.6.2. (p. 2-35), a 1945 federal court Consent Decree defined the Total Water Supply Available (TWSA) as follows:

> That amount of water available in any year from natural flow of the Yakima River, and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources, to supply the contract obligations of the United States to deliver water and to supply claimed rights to the use of water on the Yakima River and its tributaries, heretofore recognized by the United States.

The TWSA is made available to irrigation districts with non-proratable water rights, and any remainder during a drought year to proratable irrigation districts, while providing in-stream flow targets for fish.
11-2 Under P.L.103-434, Sec. 1205(b) (see DEIS p. 1-2), in 1994 Congress allocated the Cle Elum Pool Raise Project water to in-stream flows, not irrigation. However, DEIS Alternatives 4 and 5 erroneously allocate additional storage water to irrigation, while failing to explain how the additional storage water can be legally allocated that way. Do BuRec and Ecology intend to seek Congressional action and/or amend the Consent Decree to allow any additional storage at the Cle Elum reservoir to be allocated to irrigation rather than in-stream flows?

NCCC supports the proposed Wild & Scenic River designations for the Cle Elum River and the Waptus River.

NCCC supports the proposed use of logjams and side channels in the Cle Elum River to enhance fish habitat quality.

NCCC supports providing resources to the US Forest Service to monitor the area for sockeye poaching, and to provide education to the surrounding community.

NCCC supports funding for acquisition of water rights from users downstream of the Cle Elum dam.

DEIS Table ES 2 shows 195,000 CY of excavation; where is this material going?

DEIS environmental commitments include installing shoreline protection in locations on the west side of Cle Elum Reservoir to mitigate for erosion impacts; what is this "protection"?

In addition to this Cle Elum project, the Bureau of Reclamation and Department of Ecology are also preparing environmental impact statements and State Legislation-mandated cost-benefit analyses on related projects for Lake Kachess inactive storage, and the Keechelus-to-Kachess Pipeline.

NCCC does support funding for fish passage to help restore salmon to the Yakima River Basin. However, we do not support the overall Yakima Plan as proposed, and we remain opposed to funding the expansion of Bumping Lake and Wymer dams. The public is awaiting results of a cost-benefit study of these two storage projects, mandated by 2013 state legislation. The public and decision-makers deserve to know the full economic and environmental consequences of funding all of these storage projects. The Washington State Water Research Center's cost-benefit analysis should be
11-2 appended to the DEIS.

Because both the NEPA and SEPA process must be followed, we request that the BuRec and Ecology each provide separate responses to the above comments.

In summary, while we support elements of the Cle Elum Pool Raise Project DEIS, this DEIS is inadequate because it is based on the Yakima Plan Final Programmatic EIS that failed to provide reasonable alternatives, and added environmental damaging elements (NRAs promoting off-road vehicle use) after the close of comments on the Draft Programmatic EIS.

11-3 Please send us a copy any Final EIS and Record of Decision that is released.

Thank you for considering these comments.

Sincerely,

Karl F. Forsgaard

Karl Forsgaard, President
North Cascades Conservation Council

Comment Letter 12

Yakima Valley Audubon Society

Post Office Box 2823
Yakima, WA 98907
www.yakimaaudubon.org

Bureau of Reclamation
Columbia-Cascades Area Office
Attention: Candace McKinley
Environmental Program Manager
1917 Marsh Road
Yakima, WA 98901

November 24, 2014

Dear Ms. McKinley,

As an organization dedicated to the enjoyment and preservation of the natural world, the Yakima
Valley Audubon Society has reviewed the Cle Elum Pool Raise DEIS. We oppose action alternatives
4 and 5 because neither of these alternatives provides benefits for fish and we support the No Action
Alternative (Alternative 1). We support the No Action Alternative (Alternative 1) over Action
12-1 Alternatives 2 and 3 because benefits to fish appear small relative to the disturbance to the land and
water required by these two alternatives. More specifically, we do not believe it is justifiable to
inundate 46 acres of land (p. 2-42), clear 22 acres of forest (p. 2-42), build 5 miles of road (p. 2-42), or
deposit up to an estimated 34,000 CY of material into the Cle Elum reservoir (p. 2-42) in order to
increase flows in the years (53-72% of years) the reservoir would fill to its new full capacity.

We would also like clarification on exactly when water would be released from the dam under action
12-2 alternatives 2 and 3. While on page 4-6, the EIS indicates that water would be released in winter, on
page 4-7 the EIS indicates that water could also be released in summer for downstream juvenile
passage. If fish passage is important to the Bureau of Reclamation, we would like to see information
on the proposed upstream fish passage facilities in this EIS, particularly how the potential pool raise
12-3 would affect the proposed fish passage facilities. Such information is imperative to the improving
habitat for fish in the Cle Elum River watershed, and yet is omitted from this EIS. However, if
improving downstream fish conditions are important, we would like to see water conservation
measures enacted in the lower Yakima Valley (rather than changes to the Cle Elum Reservoir and
radial gates) to ensure that water can be retained within the current reservoir in summer and released
for fish in winter, without the disturbance and cost caused by the action alternatives considered in this
plan. Thus, in the final EIS for the Cle Elum Pool Raise, we would like the Bureau of Reclamation to
12-4 include an alternative does not change the radial gates of the dam, build saddle dikes, or add 'shoreline
protection', but which does require water conservation by municipalities, residences, and agriculture in
the Yakima Valley. Such water conservation measures could include subsidies to agriculture to
replace spray irrigation at orchards and vineyards with drip irrigation, subsidies to residences and
municipalities to replace lawns with xeric landscapes, or a shift in practices towards more drought-
tolerant agriculture.

We are concerned about the effects on wetlands. We feel that the impact from the loss of wetland
habitat has been understated. The current wetland areas will be inundated with an additional three feet
12-5 of water. This EIS states that the effects will be minor. We disagree with this estimation. We would
like to see wetland surveys conducted prior to the final EIS to ensure that wetland habitat is not lost.

We are also concerned about three other components of the action alternatives. First, the shoreline
12-6 protection mentioned in the alternative plans would leave approximately 83% of the shoreline
susceptible to erosion (p. 3-12, 3-14). Second, the action alternatives will not improve water
12-7 temperatures or nutrient levels in the Cle Elum Reservoir. Lastly, while the CO^2 emissions from
construction activities (385-1,200 metric tons; p. 4-90) are said to fall below thresholds set by the
Washington Department of Ecology, they are nevertheless equivalent to carbon produced by up to 100
12-8 homes and 250 cars annually (calculated from emissions calculator at
http://www.epa.gov/cleanenergy/energy-resources/calculator.html), which we do not think is a
worthwhile cost for limited or uncertain fish benefits. Overall, we would like to see mitigation offered
for these three items in the action alternatives for the final EIS.

12-9

Please consider these comments and concerns in your final EIS.

Respectfully,

Yakima Valley Audubon Society

ybsa Yakima Basin Storage Alliance

November 25, 2014

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Yakima, WA,

Dear Ms. McKinley,

13-1 We at the Yakima Basin Storage Alliance (YBSA) have read the Draft EIS for the Cle Elum Pool Raise Project and we appreciate the opportunity to comment on the document. YBSA's mission is to ensure an adequate supply of water for now and future generations for all water interests in the Yakima Basin. While we support the Integrated Plan in their goal to propose projects that increase aquatic resources and flows for agriculture and municipalities, we have concerns about the Cle Elum Pool Raise project.

<u>General</u>

13-2 We note this Draft Environmental Impact Statement on the Cle Elum Pool Raise Project (DEIS) does not include estimates of monetary benefits that would be used in determining project economic justification. While we are aware environmental impact statements are not required to contain a benefit-cost analysis, we suggest that the Bureau of Reclamation's plan formulation procedures and Washington State Legislative action in the 2013 Yakima Policy Bill (2SSB 5367) warrant consideration of project economic justification as a part of the public review process of the draft and final environmental impact statements and in the Record of Decision.

<u>Alternatives</u>

13-3 The estimated total cost of the physical alternatives are $9,901,000 and $9 601,000, a difference of only $300,000 (DEIS page 2-38). Of this total, the radial gate modification at Cle Elum Dam which will enable additional storage of 14,600 acre-feet is estimated to cost $900,000, about 9 percent of the total cost. The residual costs of this project are for shoreline protection, increasing freeboard at the saddle dike, and protecting federal recreation property and access. Alternatives for the DEIS considered, but eliminated, included access to the inactive storage in Cle Elum Reservoir and other options for increasing storage at Cle Elum Reservoir. However, non- storage options such as permanent acquisition of water rights and securing water saved through conservation activities were not considered as potential "least-cost alternatives". Why?

13-4 We do not believe the cost of the project is justified when the benefits to fish and agriculture are so minimal. It is stated that "Hydrologic modeling indicates that the existing full reservoir elevation of 2,240 feet would be exceeded in about 72 percent of the years modeled and the proposed reservoir elevation of 2,243 feet would be reached in about 52 percent of the years modeled." This implies the additional 36 cfs of flow supplied to the Cle Elum River would only occur roughly 50% of the time, and less additional water will be supplied approximately 70% of the time. An additional 20% flow that is available only 50% of the years is not significant.

13-5 Also, Alternatives 4 and 5 would provide an additional 1.6% of water during drought years for irrigators. The document states that "the maximum increase of 1.6% will increase reliability for irrigation districts during droughts" (pg 4-12); however, the prorationing level is still significantly below 70% for all but one modeled drought year (1992). Thus we find it hard to see how an increase of 1.6% will provide increased reliability to irrigators.

<u>Climate Change</u>

13-6 Page 3-53 of the DEIS states that "Reclamation expects changes in runoff in the Cle Elum River basin caused by climate change to be substantial. The shifts in runoff quantity and timing shown in the model results would cause substantial risks to water supply. Fall and winter inflow would increase, but the reservoir may not be able to refill completely before spring. This effect may mean that the enlarged storage capacity provided by the Cle Elum Pool Raise Project would be available less often…" Figure 3-5, page 3-54 of the DEIS compares the average monthly Cle Elum Reservoir water surface elevation with historical hydrologic conditions and with the moderately adverse climate change scenario. What this shows is that on the average there is no stored water between elevations 2240 and 2243 feet with the moderately adverse climate change scenario.

13-7 Since the "watershed areas above the Yakima basin reservoirs are not high in altitude (pg 3-50)," we do not understand why significant funds are being spent on reservoir enlargement projects in the Yakima basin that may or may not provide benefits to aquatic resources annually when the option is still present to pump water from the Columbia River. The headwaters for the Columbia River are in the Canadian Rocky Mountain Range, which is at a much higher elevation than the Cascade headwaters that feed the Yakima Project. Higher elevations provide a larger buffer against the effects of climate change on winter precipitation timing and type.

<u>Biological</u>

The limiting factor to success of bullhead trout and steelhead salmon recovery in the
Cle Elum River Basin is not sufficient winter flows; it is access to the upper Cle Elum
River upstream of the dam. The proposed flow increase of 36 cfs below the dam will
13-8 have little impact on anadromous fish. Flows are already managed in the
fall/winter/spring to protect spring Chinook redds. This normally means about 200 cfs of
flow, which is sufficient for fish migration. Also, the interim juvenile fish passage facility
will be reconstructed as part of the No Action alternative. Pg 4-66 states that the
"completed interim fish passage facilities would improve passage for coho and sockeye
13-9 salmon and increase nutrient levels and primary productivity for bull trout in the
reservoir." Doesn't this count towards the stated Purpose and Need for the project of
improved aquatic resources for fish rearing and migration?

Also, the instream flow fall/winter objective for the Cle Elum River appears to be 500 cfs
(Table 5-3, page 5-11, Integrated Plan FEIS). The "Winter Flow Scenario" on page 4-6
of this DEIS indicates the current winter flow minimum Cle Elum Reservoir release is
180 cfs and an additional 36 cfs represents a 20 percent increase. We note there is
13-10 also a high priority for 15,000 to 20,000 acre-feet of spring pulse flows in dry years that
were not modeled in the Integrated Plan operation studies. **Thus, YBSA suggests the
additional stored water be used for instream flow purposes to be determined by
Reclamation in conjunction with the System Operation Advisory Committee
(SOAC).**

Sincerely,

Sid Morrison

Sid Morrison
YBSA Chairman

Comment Letter 14

CEPoolRaise, BOR UCA <sha-uca-cepoolraise@usbr.gov>

Draft EIS Cle Elum Pool Raise Impact to Property Tax Lot 955981,

1 message

MJ Durkan <mj-durk@msn.com> Tue, Nov 25, 2014 at 10:42 AM
To: "cepr@usbr.gov" <cepr@usbr.gov>, MJ Durkan <mj-durk@msn.com>, "jrdurkan@hotmail.com" <jrdurkan@hotmail.com>, phil <phil@talmadgelg.com>

Ms Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia-Cascades area office

RE- DEIS Cle Elum Pool Raise impact to Tax lots 955980,955981,955982,955983,11938,11939,11940

Dear Ms. McKinley,

My name is Martin Durkan Jr. I am the managing partner for Bear Creek LLC a family partnership that owns the above mentioned properties that border the Cle Elum pool. We own approximately 22 acres that is divided into 7 tax parcels which all have access via a nature trail to the Cle Elum pool, which was rerecorded by deed at time of platting.

Our property borders Bear Creek to the west and Driftwood Acres to the east. Tax lot 955981 shares it boundaries with Bear Creek and the Lake Cle Elum pool.

Under current conditions, the NO build alternative, tax lot 955981 is experiencing severe erosion along Bear Creek caused by the raising and lowering of the Cle Elum Pool. We are losing our nature trail and access to the pool which is devaluing our property and causing harm to the environment by increasing sediments in the creek which is habitat to various species of trout.

The DEIS map 2-7 indicates that portions of our property will be inundated by the proposed project. Tax lot
14-1 955981 and Bear Creek will experience increased negative impacts from the raising of the Cle Elum pool causing
further stream bank erosion and loss of private property as well as prime wildlife and fish habitat.

Tax lots 955980,955982,955983,11938,11939,11940 will be further devalued due to the loss of our nature trail that provides our family access to the Cle Elum pool.

We respectfully request that the US Department of the Interior, Bureau of Reclamation repair the current damage being done to the environment and our property located adjacent to the Cle Elum pool and if the proposed project proceeds that tax lot 955981 and Bear Creek be protected from ongoing environmental damage caused by the raising and lowering of the Cle Elum pool.

Thank You for the opportunity to comment on your proposed DEIS project to raise the Cle Elum Pool. If you have any questions please feel free to contact me directly.

Martin J Durkan Jr.
Property Owner
14695 Salmon La Sac Hwy
Ronald WA 98941

Mailing address
M J Durkan Inc
330 SW 43rd Street
Suite K
Renton, WA 98057

20 November 2014

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia Cascades Area Office
1917 Marsh Road
Yakima, Washington

Dear Ms. McKinley:

Subject: comments regarding the Cle Elum Pool Raise Project

15-1 First, thank you for the opportunity to comment, second I found the draft EIS very frustrating in its organization, poor handling of context and missing information needed to understand the full impact of the proposal. This report also presents quantitative data poorly. All numbers should be accompanied by information describing their certainty or applicability (see note at end for a fuller discussion of this issue, it is a problem with most quantitative presentations outside of professional publications). Values reported for flows in the report are not characterized as being under the current irrigation regime or either before the irrigation projects were constructed or as modelled without the reservoirs and canals.

15-2 The key conclusion, that the proposed modification to the Cle Elum Reservoir will have NO impact one fifth of the time, minimal impact half the time and somewhere in between the rest of the time was not included in the summary and was first presented in the middle of the report and even then in a way that minimized how little benefit would be likely. The benefit to the fish would be even smaller under options 4 and 5, noted but not how little benefit the fish would receive.

15-3 There is insufficient context to evaluate the benefits of the model. For example, there should be a comparison of the projected flows in the Cle Elum River with current (last several decades) flows and estimates of what recent flows would have been in the absence of the irrigation projects.

15-4 An analysis of the impact on access to spawning gravels should have been included (this seems to be one of the major potential benefits of the project if the extra water captured is used for winter flow supplementation) – that is areas of gravel with the appropriate gravel size(s) under each of the three scenarios (future, recent historic and recent historic adjusted to remove influence of irrigation projects).

15-5 The report depends upon results of modelling, but there is too little information on the model to decide if it is appropriate or useful. For example, does it predict flows on the basis of long range (year in advance) weather predictions or does it require measurements of precipitation during the winter through most of the snowmelt runoff?

15-6 There are presumably decades of records of flows and storage levels so that it seems you could have included a table for the past fifty years with how much water could have been captured if the extra storage had been available each year, how much water would have been allowed to escape after filling the extra storage, how much water was in storage at the end of irrigation season and how much the water available for irrigation fell short of a full allocation. It seems that this data set would also allow a comparison of measured flows with modelled flows. WHY IS THIS CONTEXT ABSENT?

15-7 While there was a discussion of the difference between junior and senior or proratable and nonproratable water rights, the priority of the water captured by the proposed modifications in this ranking was not specified. My reading of the report is that the water set aside for fish under alternatives 2 and 3 will be even lower than the junior water rights holders. Thus in years when the peak flows occur over a longer period of time, the junior water right holders could receive their full allocation and still have water left in the reservoir, but because water levels never were above the current maximum allowable elevation (2240 ft. local datum) none of this would be released to benefit the fish. THE PRIORITY OF THE WATER CAPTURED BY THE INCREASED STORAGE SHOULD BE CLEARLY EXPLAINED IN THE FINAL EIS AND WHY FLOWS IN EXCESS OF THE IRRIGATION NEEDS FOR THE YEAR WOULD NOT BE RESERVED FOR SUPPLEMENTATION OF WINTER FLOWS EVEN IF PEAK LEVELS IN THE RESERVOIR NEVER EXCEEDED 2240 FEET ELEVATION.

15-8 There was no discussion of the impact of this project on operation of the reservoir before irrigation season when 126,000 acre-feet of storage is reserved for flood control. Raising the allowable pool level will increase total storage capacity. If the flood storage requirement is kept at 126,000 ac-ft, there would be an additional 14,600 ac-ft capacity available before needing to release water to maintain the flood control storage space. It would seem that under this scenario, that is when the last 14,600 ac-ft of storage are used before having to spill to maintain flood control storage should also be available for maintaining increased flows during the winter. HOW THIS POSSIBLIITY WILL BE ADDRESSED NEEDS TO BE CLEARLY EXPLAINED.

15-9 The additional volume of water which could be stored by this project is small, a few percent of the capacity of Cle Elum Reservoir and less than two percent of the total storage in the reservoir system. As noted in this DEIS, releasing the additional storage over a modest period during peak irrigation flows would produce an increase in flow too small to measure. The inverse of this is the argument that saving this amount of water out of the water stored each year would be measurable as a change in pool level but unmeasurable during delivery to the irrigation districts and therefore it should be possible to augment the winter flows without MEASURABLY impacting the water available for irrigation (it would be lost in the errors in metering the water to the irrigation districts) from the existing storage (this report should have included a table on the amount of water left in storage at the end of the irrigations season and how much water was released in excess of irrigation and base flow requirements each year). RELEASING MUCH OR ALL OF THE WATER REMAINING IN STORAGE AFTER IRRIGATION SEASON SHOULD HAVE BEEN CONSIDERED AS AN ALTERNATIVE.

15-10 The discussion of the "flip-flop" operations is wanting. Prior to initiation of the flip-flop, the reservoirs were drawn down in synchrony. As a result (the upper Yakima reservoirs represent four fifths of the storage) flows were high until the end of irrigation season in the upper Yakima River basin so that there were gravels under water for salmon to use for spawning near the end of irrigation season but which were above river level afterwards. As a result of the flip-flop, the upper Yakima reservoirs are drawn down to a greater degree before September so that more water would be held in the Naches basin reservoirs for supplying late season irrigation needs. Consequentially river levels in the upper Yakima (the river is usually used in lieu of constructed canals to convey water from the reservoirs to the diversion dams and distribution canals) are lower as they no longer have to supply as much water to the Wapato and Sunnyside Districts. Also as part of the flip-flop, the canal from Easton is used to bypass flows around several miles of the the upper Yakima River. I presume that the Cle Elum Reservoir is drawn down to a greater degree than the Kachess and Keechelus Reservoir prior to initiating the flip flop, and vice versa after the start of flip-flop. This could result in flows in the Cle Elum River during the flip-flop that are no higher than the required minimum winter flows. The result is that salmon are denied access to usable spawning gravels (they used them before the flip-flop) in the Cle Elum River and between the Easton diversion and where water returns to the river just above the canyon between Cle Elum and Thorp. Yes, this means that fewer eggs would die because of desiccation but it also means that the spawning opportunities have been unnecessarily diminished in years when there would be water remaining in the reservoirs after the conclusion of irrigation which could have been released to benefit fish. RELEASING WATER REMAINING IN STORAGE AFTER IRRIGATION SEASON SHOULD HAVE BEEN CONSIDERED AS AN ALTERNATIVE.

15-11 As a partner in the management of water in the Yakima River, Ecology has several options available that are not directly available to the Bureau of Reclamation. These include acknowledging that there are water rights that predate the current senior water rights (that is for the Native Americans who fished

these rivers before Europeans or Americans ever saw them and the European Americans who caught salmon from the Yakima River before there were any major irrigation projects). The Boldt decisions
15-11 established that the treaty rights of Native Americans to fish are valid and substantial, subsequent decisions have concluded that the right to fish also means that there must be fish to be taken. That is there should be instream flows and fish passage at all dams which would otherwise block migration for the benefit of fish and the takers of those fish which predate and take precedent over all diversions. WHY IS THERE NO DISCUSSION OF THIS POSSIBILITY? Water rights are not the same as the right to own an acre of land, the State still retains ownership and could charge users of this public resource for that usage. WHY IS THERE NO DISCUSSION OF THIS POSSIBILITY? Requiring payment for water taken would encourage efficient use of water and direct water toward the highest economic value uses
15-12 (assigning values to fish and habitat would help in determining what the minimum instream flows [hydrograph] should be as a function of the amount of water available, for example a quarter of the 'natural' flow should be reserved for fish and flows for irrigation should not exceed four times the natural flow expected for that year's precipitation at that time).

There is no discussion of the costs for this proposal, for example, how much would it be expected to cost and who would be responsible for paying for it? The historic record is disappointing in this regard: the original loan from the Federal government to construct the Yakima Project has not been repaid in the century since the first loans were made and the repairs to the upper Yakima River dams were made mostly at the taxpayers' expense (only 15% was charged to irrigators despite the fact that they are the principle beneficiaries of the reservoirs; if flood control was the dominant concern there would appear to have been a cheaper alternative, leave the outlet works open at all times so that they act as throttle on the discharge, maintain a pool approximating the original lake level and store water when flows exceed the capacity of the outlet works, essentially limiting flows to flood stage or only flooding of the lowest
15-13 lying areas). With the outlet open at all times, pool level would be stabilized (except during peak flows when it would be above the level of the outlet as was true when the lakes were present but with a greater range of variation) and outmigrating smolts would be free to leave when they were ready. For outmigrating smolts and adults migrating upriver it could be useful to construct an artificial riffle or rapids downstream of the outlet pipe to provide access to the downstream end of the pipe and maintain a deeper and lower velocity flow in the pipe. WHY IS THERE NO DISCUSSION OF COSTS, WHO WOULD PAY AND THE RECORD OF PAYMENTS BY THE BENEFICIARIES OF THE YAKIMA PROJECT? IF THE IRRIGATORS ARE UNWILLING TO REPAY THE COSTS OF CONSTRUCTION AND MAINTENANCE (INCLUDING REPAIRS) OR MITIGATION ACTIVITIES SUCH AS CONSTRUCTING FISH LADDERS WHICH WORK AT ALL RESERVOIR LEVELS, THEN THE PROPOSAL FOR LIMITING THE DAMS FUNCTION TO FLOOD CONTROL AND ALLOWING FREE PASSAGE OF FISH SHOULD BE SERIOUSLY CONSIDERED.

The discussion of economic impact (e.g., table 3-15) uses data for four counties (Kittitas, Yakima, Benton and Franklin). Franklin County does not receive irrigation water from the Yakima Project and Benton County depends upon roughly four percent of the storage capacity. Including Benton and
15-14 Franklin Counties in the analysis distorts the results. Table 3-17 does not include Franklin County, but does include Benton County with its small fraction of the irrigated area and a major employer at Hanford and still distorts the averages. There is no discussion of how the use of migrant (often immigrant) workers in the agricultural sector affects the data (are the numbers in the table for total workers or full
15-15 time equivalents). THE DISCUSSION NEEDS TO EXPLAIN HOW PART TIME, MIGRANT AND IMMIGRANT WORKERS ARE COUNTED. The discussion of the data in table 3-17 doesn't seem to match the data, Kittitas and Yakima Counties, especially the populated areas, are almost entirely in the Yakima Project area, so that it make no sense to me when the percent of families or individuals below the poverty level
15-16 are lower for the study area than they are for either Yakima or Kittitas Counties, please explain. Using the data presented in table 3-15 (the lack of information on distributions within categories limits the utility of the following calculations), the average pay in the agricultural sector is less than all others (I
15-17 excluded the data for the mining category since it so far out of line with the other categories, I suspect that the personal income should have been 70 rather than 7 million) and is only about ten percent of
15-18 employment and income for the area. GIVEN THE APPARENTLY POOR RETURN FROM AGRICULTURE IN

15-18 TERMS OF WAGES, WHY ARE WE PROPOSING TO INVEST IN THIS SECTOR RATHER THAN IN SECTORS SUCH AS MANUFACTURING OR TRANSPORTATION?

In summary, I believe that the proposal to raise the maximum pool level is unnecessary and other measures, such as releasing stored water after the irrigation season, should be used in preference to the
15-19 four active alternatives proposed. Given that agriculture provides the least benefit to workers in the area, investment of government money would be better directed to other areas such as restoring salmon runs directly. The Yakima Project extirpated the sockeye salmon runs (there were other activities impacting them such as overharvesting and removal of beavers, but these were not as definitive as the dams were). The project was constructed without fish passage facilities, as was required by law (and generally ignored by dam builders at the time), it is time that the irrigators (and other users) repay the loans and start a major program of mitigation of the damage done to the fisheries and the riverine habitat in general (the removal of the dams on the Elwha River makes a good precedent for undoing as much of
15-20 the damage done by the Yakima Project as possible). Even the two nominally fish friendly alternatives (2 and 3) include actions (releasing water for smolt outmigration during irrigation season) which may benefit salmon, but increasing flows during the winter would seem to be of greater long term benefit in restoring salmon to the Yakima basin – the smolts in Cle Elum reservoir depend upon trucking adults past the dam and therefore do not represent a potentially permanent solution. UNTIL THE USERS OF THE WATER STORED IN THE RESERVOIRS PAY FOR THE EXISTING FACILITIES AND MAKE A MEANINGFUL CONTRIBUTION TO THE MITIGATION OF THE ADVERSE IMPACTS OF THE RESERVOIRS AND THE USE OF THE RIVER IN LIEU OF CANALS HAS BEEN MADE, ALL CURRENT AND FUTURE INVESTMENTS OF TAXPAYERS MONEY IN THE YAKIMA PROJECT SHOULD BE STRICTLY LIMITED TO MITIGATION EFFORTS.

Thank you for this opportunity to comment on the Cle Elum Pool Raise DEIS.

Sincerely,

Phelps Freeborn

Phelps Freeborn
3409 Taylor Way
Yakima, Washington 98902
(509) 454-0871

Note on presentation of numeric values.

A single number can convey a sense of the magnitude and significance, but without some qualifications it can also be badly misleading. When the uncertainty in the value is larger than the range of the last significant digit, the result should be rounded (a result of 53 with a standard deviation of 15
15-21 would be better presented as 50). If the outcomes for modelling the filling the additional storage capacity ranged from five to seventy percent (that is the 10th through the 90th percentiles) with an average of 50 percent, that is very different from a range of 45 to 55 percent. As noted earlier, the information in table 3-15 provides little or no indication of how many of the agricultural jobs are seasonal (seasonal jobs provide less benefit to the worker than full time because of the additional costs of travel and short term housing plus disruptions to schooling for children, etc.) or what the range in full-time equivalent wages are (from \$18,000 to \$50,000 or from \$10,000 to \$200,000 for example). Results from
15-22 calculations or measurements should be accompanied by a measure such as the standard deviation (if the distribution is normal or nearly so). Populations should be characterized by quartile (or finer) values unless they have been demonstrated to be normally distributed and a standard statistical measure is appropriate.

P.S. I could bring a copy of this on a thumbdrive if you want. It would be early December. P Freeborn

Edward M. Henderson, Jr.
407 Smith Street
Seattle, Washington 98109
edhenderson57@comcast.net
(206) 283-6497

November 25, 2014

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, WA 98901-2058
Via Email to: cepr@usbr.gov

RE: Cle Elum Pool Raise, Comments on Draft Environmental Impact Statement

Dear Ms. McKinley:

16-1 I am familiar with the Final Programmatic Environmental Impact Statement (FPEIS) for the Yakima River Basin Integrated Water Resource Management Plan (The Integrated Plan). In the FPEIS for the Integrated Plan the impacts of many basin wide issues are glossed over to be "dealt with later in project specific EIS's." This disingenuous attempt to lose these issues between the Tier 1 programmatic FPEIS for the Integrated Plan and the Tier 2 project DEIS's is unacceptable. Therefore the scope of this Environmental Impact Statement (EIS) must be broad enough to address these basin wide impacts and not be limited to only local site-specific impacts. This EIS must deal with all impacts in the context of the Yakima River Basin Integrated Plan and fully consider the cumulative effects on the entire Yakima River Basin by all the elements of the Integrated Plan. This DEIS for the Cle Elum Pool Raise fails to do that. By failing to provide a Conservation Alternative this DEIS violates the requirements of NEPA to consider appropriate alternatives to the proposed action.

16-2 The National Environmental Policy Act (NEPA) of 1969 states, in part, as follows:

"SEC. 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall— . . .
(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;"

The EIS for this project must present a conservation alternative for public examination and comment. A comprehensive and mandatory conservation program in the Yakima River Basin could provide the same amount, 14,600 acre-feet, of water to augment in-stream flows as raising the spillway radial gates. This water would be available without either the environmental impacts or financial cost of the proposed construction project.

16-3 Title XII THE YAKIMA RIVER BASIN WATER ENHANCEMENT PROJECT (1994) that authorized the modifying the Lake Cle Elum spillway radial gates to raise the pool level by three feet, thereby impounding an additional 14,600 acre-feet of water, clearly intended conservation to be a major component of such enhancement.

16-3 Section 1201 PURPOSES. are subsection (3) "to authorize a Yakima River basin water conservation program…" and subsection (4) "to realize sufficient water savings from the Yakima River Basin Water Conservation Program so that not less than 40,000 acre-feet of water savings per year are achieved by the end of the fourth year of the Basin Conservation Program, and not less than 110,000 acre-feet of water savings per year are achieved by the end of the eighth year of the program, to protect and enhance fish and wildlife resources;" The Integrated Plan and this DEIS have failed to meet these legal requirements of Title XII.

16-4 Furthermore, Alternatives 4 & 5, to utilize the impounded 14,600 acre-feet of water to augment the Total Water Supply Available (TWSA) and to use it for out-of-stream purposes, irrigation, are not authorized by the Enhancement Project and are unlawful!

Title XII, SECTION 1205. OPERATION OF YAKIMA BASIN PROJECTS, subsection (b) "WATER FROM LAKE CLE ELUM- Water accruing from the development of additional storage capacity at Lake Cle Elum, made available pursuant to the modifications authorized in section 1206(a), shall not be part of the Yakima River basin's water supply as provided in subsection (a)(1). Water obtained from such development is exclusively dedicated to instream flows . . . "

Please remove these illegal Alternatives from the Final EIS.

16-5 Table ES-2 on page ES-viii SUMMARY OF COMPARISON OF IMPACTS under Alternative 1 – No Action states, "Reservoir would take longer to fill during dry years." The height of the radial gates has no effect on the rate of filling up to elevation 2240'. The rate of filling is entirely dependent upon the rainfall in the catchment basin and the rate of discharge over the dam. This statement implies that the slow filling of the reservoir is caused by the lack of the additional three feet of height on the radial gates. This is not true. Please delete this deliberately misleading statement from the summary and throughout the DEIS.

16-6 Thank you for the opportunity to comment on the DEIS for this project and to make recommendations for issues to be addressed. Please notify me when the Final EIS is published.

Sincerely,

/s/ ***Ed Henderson***

Edward M. Henderson, Jr.

Comment Letter 17

CEPoolRaise, BOR UCA <sha-uca-cepoolraise@usbr.gov>

LAKE CLE ELUM RESERVOIR

1 message

Richard <sprgk247@msn.com> Wed, Oct 29, 2014 at 2:32 PM
To: "cepr@usbr.gov" <cepr@usbr.gov>

I believe raising the reservoir is an entirely waste of money.

First of all, there are 3 reservoirs - Keechelus, Kachess and CLe Elum.
The reservoir are nothing more than a big hole in the ground to hold water.

I would suggest that you make the holes larger by means of sand and gravel excavation, removal of top soil and removal of stumps that could be sold for landscaping and other purposes. The money received from these items would go a long ways to paying for fish ladders, acquiring fish habitat for spawning and improve the recreational opportunities of each reservoir. To me it is a win-win situation for all parties and instead of spending money to increase
17-1 capacity the USBR could be making money.

I tried to get a permit through the USBR over thirty years ago. If the permit would have been granted, the reservoir capacity would not be a topic of discussion today.

Also, what are the long term costs to maintain all the improvements needed to raise the reservoir versus having a bigger hole(s) with no additional maintenance.

I ask that you please carefully review my proposal and review all associated costs versus the increase in revenue.

Thank you for your consideration

Dick Kloss
716 E. 2nd St.
Cle Elum, WA 98922

Comment Letter 18

CEPoolRaise, BOR UCA <sha-uca-cepoolraise@usbr.gov>

Comments: Cle Elum Pool Raise NEPA/SEPA Draft Environmental Impact Statement (EIS)

1 message

AnnMarie Lawler <amlawler@outlook.com> Mon, Nov 10, 2014 at 3:48 PM
To: "cepr@usbr.gov" <cepr@usbr.gov>
Cc: AnnMarie Lawler <amlawler@outlook.com>

Dear Candace,

We own two private property lots, one with high and one with mostly low bank water front on Lake Cle Elum on Domerie Bay Road. We support the need to raise the level of Lake Cle Elum to increase the amount of water available. Our properties will be directly affected by this lake level change.

"Pg 2-31 Domerie Bay Road, Mile 2.1-2.6.
Along the shoreline adjacent to Domerie Bay Road, Reclamation would construct three discontinuous sections of shoreline protection, totaling 2,000 feet long. Construction would include log terraces and a perched beach at the north end. The perched beach would extend roughly 500 feet in length and 100-200 feet behind the existing high water line."

After reading the Cle Elum Pool Raise NEPA/SEPA Draft Environmental Impact Statement, we are significantly concerned about the proposed solutions to mitigate the negative impacts of this project to our property. It has been proposed that our high bank waterfront will be secured with log terraces and our low bank water front will be supported with perched beaches.

18-1

These options, in our opinion, are not enough to protect the sand banks on our properties. When the water level increases 3 feet there will be a significant increase in damage to existing property on Domerie Bay. This extra 3 feet of water will bring the high water line onto the sand banks of our property for a much more extended timeframe. At current lake levels the sand banks on our property erode every year during the time the water is at its highest level. The waves from the consistent wind across the lake, cause the erosion. This issue will dramatically increase with the lake level and needs to be addressed with adequate protection before allowing lake levels to rise. Waiting to address this issue after the water level increases will create unnecessary irreversible damage to the existing shoreline, trees and foliage.

We agree that low banks in Domerie Bay will be adequately protected by perched beaches as the proposal states. The low bank waterfront is relatively flat, and would need to be monitored for high water line erosion.

For high bank areas, we would like to see actual rockery and riprap to protect those tall sand banks. Log terraces will help disperse waves prior to contact with the sand bank, but will do nothing to protect from the higher water level itself eroding the bank. Keeping the water away from the sand bank is the only way to avoid the inevitable erosion from the extra 3 feet of water and generally higher lake levels. Rockery of these types, based on information in the impact statement, should

18-1 protect the banks and the trees along the shoreline of Lake Cle Elum.

We would greatly appreciate a response to this letter and hope that an appropriate solution can be found to correct the problem identified.

Thanks so much for your time - Stephen and AnnMarie Lawler

Comment Letter 19

SIERRA CLUB
FOUNDED 1892

180 Nickerson St #202, Seattle WA 98109
206-378-0114 x308
www.sierraclub.org/habitat

November 25, 2014

Submitted via email to ***cepr@usbr.gov***

Ms. Candace McKinley
Environmental Program Manager
Bureau of Reclamation / Columbia-Cascades Area Office
1917 March Road
Yakima, WA
98901-2058

Cle Elum Pool Raise Project DEIS

Dear Ms. McKinley:
RE:

19-1 Sierra Club submits these comments on the Cle Elum Pool Raise Project Draft Environmental Impact Statement (DEIS), dated September 23, 2014. These comments are submitted under both NEPA and SEPA.

19-2 The project needs to provide mitigation for the loss of the acres of wildlife habitat that would be inundated by the pool raise. Most of the acreage proposed to be flooded is healthy riparian habitat on National Forest lands. Under DEIS Alternatives 2 through 5, the three-foot rise in the lake level "would inundate approximately 30 acres of coniferous forest, 11 acre of deciduous tree and shrub, and 0.1 acres of herbaceous vegetation between 2,240 feet and 2,243 feet," (pp. 4-49 and 4-50) and includes "2 acres of palustrine wetlands in the area that the higher reservoir level would inundate," (p. 3-36). There needs to be acquisition of equivalent or better acreage and quality of habitat elsewhere.

The DEIS states that the proposed project is an integral part of the Yakima Plan. The Yakima Plan's March 2012 Final Programmatic EIS (FPEIS) did not evaluate cumulative impacts at the project level. Consequently, now that we are at the project level, the Cle Elum Pool Raise DEIS must evaluate the cumulative impacts of the proposed project in combination with the other elements of the Yakima Plan. This includes, but is not limited to, water demand and water conservation alternatives. Please provide a cost-per-acre-foot comparison between the proposed pool raise and water conservation. In addition, aquifer storage, water marketing, alternative agriculture and cropping, are reasonable alternatives that must be analyzed in detail as part of this DEIS.

The DEIS discusses tiering to the Yakima Plan FPEIS and documents adopted under SEPA (DEIS sections 1.6.1 and 1.6.2; pp. 1-9 to 1-10). However, the Yakima Plan FPEIS included only two alternatives (the Yakima Workgroup's Yakima Plan and a no-action alternative), when both NEPA and SEPA require an analysis of reasonable alternatives. Neither BuRec nor Ecology should adopt or incorporate by reference the Yakima Plan FPEIS because of the lack of reasonable alternatives presented for analysis in the Yakima Plan FPEIS.

BuRec should comply with the Fish and Wildlife Coordination Act and consult with the U.S. Fish and Wildlife Service on the Cle Elum Pool Raise Project.

As discussed in DEIS section 2.6.2. (p. 2-35), a 1945 federal court Consent Decree defined the Total Water Supply Available (TWSA) as follows:

> That amount of water available in any year from natural flow of the Yakima River, and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources, to supply the contract obligations of the United States to deliver water and to supply claimed rights to the use of water on the Yakima River and its tributaries, heretofore recognized by the United States.

180 Nickerson St #202, Seattle WA 98109
206-378-0114 x308
www.sierraclub.org/habitat

The TWSA is made available to irrigation districts with non-proratable water rights, and any remainder during a drought year to proratable irrigation districts, while providing in-stream flow targets for fish. Under P.L.103-434, Sec. 1205(b) (see DEIS p. 1-2), in 1994 Congress allocated the Cle Elum Pool Raise Project water to in-stream flows, not irrigation. However, DEIS Alternatives 4 and 5 erroneously allocate additional storage water to irrigation, while failing to explain how the additional storage water can be legally allocated that way. Do BuRec and Ecology intend to seek Congressional action and/or amend the Consent Decree to allow any additional storage at the Cle Elum reservoir to be allocated to irrigation rather than in-stream flows?

Sierra Club supports the proposed Wild & Scenic River designations for the Cle Elum River and the Waptus River.

Sierra Club supports the proposed use of logjams and side channels in the Cle Elum River to enhance fish habitat quality.

Sierra Club supports providing resources to the US Forest Service to monitor the area for sockeye poaching, and to provide education to the surrounding community.

Sierra Club supports funding for acquisition of water rights from users downstream of the Cle Elum dam.

19-2 In addition to this Cle Elum project, the Bureau of Reclamation and Department of Ecology are also preparing environmental impact statements and State Legislation-mandated cost-benefit analyses on related projects for Lake Kachess inactive storage, and the Keechelus-to-Kachess Pipeline.

Sierra Club does support funding for fish passage to help restore salmon to the Yakima River Basin. However, we do not support the overall Yakima Plan as proposed, and we remain opposed to funding the expansion of Bumping Lake and Wymer dams. The public is awaiting results of a cost-benefit study of these two storage projects, mandated by 2013 state legislation. The public and decision-makers deserve to know the full economic and environmental consequences of funding all of these storage projects. The Washington State Water Research Center's cost-benefit analysis should be appended to the DEIS.

Because both the NEPA and SEPA process must be followed, we request that the BuRec and Ecology each provide separate responses to the above comments.

In summary, while we support elements of the Cle Elum Pool Raise Project DEIS, this DEIS is inadequate because it is based on the Yakima Plan Final Programmatic EIS that failed to provide reasonable alternatives, and added environmental damaging elements (NRAs promoting off-road vehicle use) after the close of comments on the Draft Programmatic EIS.

Please send us a copy any Final EIS and Record of Decision that is released.

19-3 Thank you for considering these comments.

Sincerely,

Margie Van Cleve

Margie Van Cleve
Washington State Chapter Chair
Sierra Club

Comment Letter 20

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YAKIMA COUNTY FARM BUREAU

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www.yakimacountyfarmbureau.com

P.O. Box 429
Wapato, WA. 98951
(509) 248-5640

November 17, 2014

Ms. Candace McKinley
Environmental Program Manager
Columbia-Cascades Area Office
Bureau of Reclamation
1917 Marsh Road
Yakima, Washington 98901-2058

RE: Comments on Lake Cle Elum Draft Pool Raise

To Whom It May Concern,

20-1 The Yakima County Farm Bureau (YCFB) represents over 3,000 Yakima County members on agricultural related issues in Yakima County, and is the largest agricultural organization in Yakima County. It is a voluntary, grassroots advocacy organization, representing the social and economic interests of our farm and ranch families at the local, state and national levels. Yakima County produces approximately $5 billion in agricultural products annually and is one the most diversified agricultural producing counties in the country.

YCFB prefers number 4 or 5 of the listed alternatives for the use of additional water created by raising Lake Cle Elum Dam three feet. Both alternatives would use the additional stored water for TWSA (Total Water Supply Available), and do shoreline protection. We would support the most efficient shoreline protection option.

20-2 Allowing this additional water to go to the TWSA instead of <u>only</u> for instream flows would allow greater flexibility in responding to water shortages in the basin, as noted in your report. When congress made the instream flow designation for this water back in 1994, they could not have known conditions would change that have enhanced these flows through better water management and acquisition of fish specific water. At that time, water for instream flows was short and congress was trying to address it.

20-2 However, local cooperation and foresight helped to address the flow issue before the work on Lake Cle Elum could get started. Now it makes more sense to put additional stored water into the TWSA to benefit a larger part of our basin.

Thank you for this opportunity to provide input.

Sincerely,

Steven E. George
Secretary

c. 13th, 14th, 15th District State Legislators
Congressman Doc Hastings
4th District Congress Elect Dan Newhouse

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Comment Letter 21

Ms. Candice McKinley
Environmental Program Manager
Bureau of Reclamation
Columbia-Cascades Area Office
1975 Marsh Road
Yakima, WA 98901-2058
Phone 509-575-5848, ext. 613
Fax. 509- 454- 5650
Email: cepr@usbr.gov

Received in Mailroom
CCAO DEC 15 2014 YFO
Yakima, Washington

Dear Ms. McKinley:

21-1 Our family is deeply concerned about the proposal to raise the level of Lake Cle Elum by 3 feet. Our affected property is located at 12171 SR 903, and is comprised of 11.03 acres, all fronting the lake. This is one of the oldest developments on Lake Cle Elum. It was originally developed between 1938 and 1940 by Grace and Robert Wadsworth shortly after the construction of Lake Cle Elum Dam, and was used as a summer resort and dude ranch with live-in caretaker until it was purchased by our parents, Don and Margaret McGugin, in 1976. The original lodge was constructed of logs and is still in use as Margaret's (who is in her 90's) primary residence. This property has one of the few low bank access points to the Lake, and this is a particularly valuable amenity of the property at present.

Many improvements were added by the McGugins over the years, including a swimming pool building, a chapel, and a detached bed and bath guest house, all crafted of logs to match the construction of the original lodge. A new shop was also added, the original shop building was added on to, and a pole building with concrete floor was built in the low bank portion of the property next to the lake. This building was originally used as a seaplane hanger, and now houses various vehicles.

This pole building is likely to be consumed by the lake if it is raised by 3 feet, and the low bank drivable access to the embayment in which this building is located is also likely to be lost. In addition, the drainfield for the lodge is located between it and the lake, and we fear that a pool raise of 3 feet may affect the proper function of this critical amenity, which would make the property un-livable. Finally, the swimming pool building is already close to the lake on a bluff that will be subject to significant erosion due to the raise. Ultimately, the original historic lodge may also be threatened.

In addition to the low bank access at the southern end of the property, there is an access to the lake from the north end that is particularly useful in winter during snowmobile season, when the low bank gate becomes inundated with snow and can't be opened. We fear that this access may be lost also.

Because of these many issues significantly affecting the value and livability of this property, we would like assurances from BOR that sufficient attention will be made to our concerns, and specifically that the following questions be addressed:

21-1

1. The information provided in the DEIS for the Cle Elum Pool Raise Project contained only a fuzzy aerial depiction of where erosion protection may occur. Our entire property appears to be located in this depiction, and is identified as an area needing bulkheading. Will there be a detailed elevation and property line survey forthcoming that will show what part of this property will be inundated by water and what part will be consumed by bank protection?
2. The cement floored airplane hanger appears to be in the inundation area. How much will this area be affected, and will we be compensated for the building and its specific uses if it is lost?
3. This is also the location of the only remaining portion of our property that is at present beach grade. Inundation and armoring of this area will significantly decrease its usefulness and value as a drivable low bank access point. Will we be compensated for the loss of this valuable portion and use of our property?
4. The north end of our property also has at present a drivable access point to the beach. Will this access be rebuilt as part of the bulkheading project?
5. Will it be necessary to use any of our property for access to build the bulkhead, given that there is a public access road to Speelyi Beach to the south of the property that could be used to build the bulkhead from the beach side?

Please respond in writing by mail to the following address:

Cymantha Burkle, Daughter and Executrix of the McGugin estate
70 West Moore Road
Elma, WA 98541

Thank you for the opportunity to provide these comments.

Cymantha Burkle

Cymantha Burkle

Comment Responses

Comment Letter No. 1 – Confederated Tribes and Bands of the Yakama Nation, Department of Natural Resources

1-1	Comment noted. The Integrated Plan included the use of the increased storage resulting from the Cle Elum Pool Raise Project to improve streamflows for fish and to increase water supply for out-of-stream needs. This was included in the Preferred Alternative in the Integrated Plan PEIS and selected for implementation in Reclamation's Record of Decision. Reclamation and Ecology included the use of the additional storage capacity for TWSA as Alternatives 4 and 5 in this EIS in order to fully evaluate the impacts and benefits of using the additional storage capacity for both uses identified in the Integrated Plan. As described in Chapter 1, Reclamation and Ecology have identified Alternative 3 which would use the additional storage capacity for instream flow as the Preferred Alternative.
1-2	Comment noted. Corrections and additional detail on the winter flow regime in the Cle Elum River has been added to Sections 3.2 and 4.2 of this FEIS.
1-3	This FEIS has been revised to include the permanent fish passage facilities at Cle Elum Dam as part of the No Action Alternative. Reclamation intends to start construction on the first phase of the permanent fish passage facilities in fall 2015, so the project meets the criteria for inclusion as a No Action Alternative project. A description of its current design is included in Section 2.3. Section 4.2.4.2 has been revised to more accurately describe how the additional storage capacity could be used to benefit fish passage.
1-4	Section 4.2.4.2 has been revised with new instream flow scenarios to better describe the impacts that would occur from using the additional storage capacity for instream flow.
1-5	Comment noted. See the response to Comment 1-1.

Comment Letter No. 2 – Environmental Protection Agency

2-1	Comment noted.
2-2	Comment noted.
2-3	Comment noted.
2-4	Your comments about the status of water quality in Cle Elum River and Reservoir are noted and are documented in Section 3.4 of the FEIS. Reclamation will implement best management practices to minimize water quality impacts during construction, as described in Sections 4.3.8 and 4.4.8 of the FEIS. In addition, all construction would occur during dry reservoir conditions further reducing the potential for sediment or contaminants to enter the reservoir during construction. Potential impacts to surface water quality and groundwater are described in

	Sections 4.4 and 4.5 of the FEIS. As described in Section 4.5, construction and operation of the shoreline protection measures are not expected to impact groundwater quality or aquifer recharge. Section 4.3 of the FEIS describes the potential for shoreline erosion with the higher reservoir levels. As noted in Section 4.3.8, Reclamation would continue to implement its existing inventory of shoreline conditions (Section 2.4.3.5) and would undertake further actions to minimize erosion from the higher reservoir level as needed. Increased erosion from land use, including forestry activities, has been added to cumulative impacts from past land use practices in Section 4.24.1 of the FEIS.
2-5	See the response to your Comment 2-4. Information has been added to the cumulative impact evaluation in Section 4.24 of the FEIS.
2-6	Section 4.4.8 of this FEIS has been revised to state that Reclamation would obtain all applicable permits for water quality, including the NPDES permit. Section 4.26, Environmental Commitments, of the FEIS states that Reclamation would obtain all applicable Federal, State, and location permits.
2-7	See the response to Comment 2-6. Sections 4.4.8 and 4.7.8 have been revised to include that Reclamation would obtain Section 404 and Section 401 permits.
2-8	Reclamation has coordinated with the Service, NMFS, and WDFW on the Proposed Action and will continue to do so. It is not expected that the ESA consultation with the Service and NMFS will be completed before the FEIS is issued; however, Reclamation will not issue a Record of Decision before the consultation is complete. As stated in Sections 4.9.8, 4.29, and 5.4.1, Reclamation will implement mitigation measures required by the Service and NMFS.
2-9	Reclamation is in the process of incorporating Integrated Pest Management concepts and plans at each of its owned and operated facilities. These plans are being processed through Reclamation's Environmental Management System (EO 13423, "*Strengthening Federal Environmental, Energy, and Transportation Management*") which monitors environmental issues quarterly. Information has been added to Section 4.7.8 to describe that Reclamation would coordinate with the USFS to control invasive species in compliance with EO 13423.
2-10	Information about seismic risk has been added to Section 4.3.4.1 of the FEIS. Reclamation has concluded that the potential for landslides, slope movement and seismicity in the area is remote.
2-11	Reclamation's existing shoreline inspection program is described in Section 2.4.3.5 of the FEIS. This section notes that Reclamation will continue this program and will implement appropriate mitigation measures, as needed. This inspection program is based on experience gained in operation of the reservoir. Continued implementation of this program is included as an Environmental Commitment in Section 4.29 of the FEIS. Reclamation has added development of an environmental inspection and mitigation-monitoring program as an environmental commitment in Section 4.29

	of this FEIS. Reclamation will coordinate development and implementation of this program with the USFS, WDFW, WDNR, the Service, NMFS, and other State and Federal agencies, as appropriate. The program will ensure that all environmental commitments can be met. Reclamation will conduct environmental review and compliance on this program when it is developed. These environmental commitments will be included in the Record of Decision for the Cle Elum Pool Raise Project FEIS.
2-12	Receipt of your attached rating system is acknowledged.

Comment Letter No. 3 – National Marine Fisheries Service

3-1	Comment noted.
3-2	Your comments about the description of existing flow conditions are noted. Sections 3.2 and 4.2 have been revised for clarity. See the responses to your specific comments about flows below.
3-3	Section 4.2 of this FEIS has been revised to provide a more detailed discussion of existing Cle Elum River winter flows and the benefits that would occur to instream flow with the project. Section 4.2.4.2 says that under no action conditions, minimum flow releases range from 180 to 220 cfs with a typical minimum release of 220 cfs. The section discusses how the additional storage capacity would be used to augment these flows.
3-4	See the response to Comment 3-3. The additional storage capacity would be used to increase low flows in the Cle Elum River under Alternatives 2 and 3. Reclamation would track the volume of flow released above current operating minimum releases. For example, when flows would have been at 220 cfs the accrued water (when available) would be released to increase flows to about 250 cfs. If flows naturally increase, they would not be accounted for or debited against the additional storage capacity.
3-5	Reclamation and Ecology acknowledge that the Endangered Species Act (ESA) Section 7 consultation is ongoing for operation and maintenance of the Yakima Project. The agencies anticipate that the outcome of that consultation would include improved streamflows in the Cle Elum and Yakima rivers. However, the results of the consultation and specific instream flow requirements are not yet known. Therefore, the baseline for comparing instream flow conditions with the Proposed Action is existing conditions. The criteria that Reclamation and Ecology used to define the No Action Alternative are defined in Section 2.3 of the FEIS. Since any new requirements for instream flows in the Cle Elum or Yakima rivers have not been defined and are not scheduled for implementation, they cannot be considered part of the No Action Alternative. Because any improvements in streamflow that might occur as a result of the ESA consultation on Yakima Project operation and maintenance have not been quantified, it is not possible to clarify how the Cle Elum Pool Raise project would contribute to fish production in addition to flows required by consultation. Reclamation and Ecology intend that improved streamflows from the additional

	storage capacity would supplement any improvements required by the ESA consultation for Yakima Project operation and maintenance.
3-5A	As you note, the alternatives proposed for the Cle Elum Pool Raise Project rely on additional storage capacity to improve instream flows and water supplies. The purpose of this FEIS is to evaluate the potential impacts of the Cle Elum Pool Raise project as well as evaluating alternatives for use of the additional storage capacity and options for providing shoreline protection as described in Sections 1.2, 2.1, and 2.2 of this FEIS. Reclamation will continue to work with NMFS through the ESA consultation on Yakima Project operation and maintenance to determine if project operations can be modified to meet needs for instream flow.
3-6	Your comments about the future role of the Integrated Plan Adaptive Management Group in advising Reclamation on instream flows are noted. Currently only the Systems Operations Advisory Committee (SOAC) is authorized by Congress to advise Reclamation on instream flows. The process of formalizing the role of the Integrated Plan Adaptive Management Group is being moved forward separately from this FEIS. Reclamation intends to include the Integrated Plan Adaptive Management Group in decisions on instream flows when that process is completed. In the meantime, Reclamation will continue to seek input from NMFS on instream flows.
3-7	See the response to Comment 1-3 regarding inclusion of permanent fish passage facilities in the No Action Alternative.
3-8	The outlet design was still in process when the DEIS was being written, but has now been set at elevation 2,178. The lowest operational level for the fish passage facility would be elevation 2,180. Section 4.2.4.2 of this FEIS (Scenario 4) includes a description of how Reclamation would manage the additional storage capacity to benefit fish passage through the permanent fish passage facilities.
3-9	Updated information on steelhead has been added to Section 3.9. Section 4.9.4.2 describes the expected benefits to MCR steelhead of the different instream flow scenarios. Section 4.9.6.2 notes that using the additional storage capacity for TWSA would not benefit MCR steelhead. Section 4.2 acknowledges that MCR steelhead are not currently found in Cle Elum Reservoir, but may be reintroduced in the future and describes potential impacts to steelhead from project components. Potential impacts to MCR steelhead has been added to cumulative impacts in Section 4.24.3.
3-10	Reclamation has now initiated ESA consultation with NMFS and that is acknowledged in this FEIS.
3-11	Section 4.6.4 includes evaluation of the potential impacts of shoreline protection on fish. Reclamation's would continue its reservoir shoreline inventory and maintenance program as described in Section 2.4.3.5. In addition, Reclamation's environmental inspection and mitigation-monitoring program (see Comment Response 2-11) would include evaluation of the performance and application of individual erosion treatments.
3-12	Comment noted.
3-13	Comment noted. Your letter and the comment matrix have been combined for

	the FEIS.
3-14	See the response to Comment 1-3 regarding inclusion of permanent fish passage facilities in the No Action Alternative.
3-15	Section 4.12 of this FEIS has been revised to provide more detail on the effects of climate change on the project. A new table 4-19 has been added to Section 4.12 to show the dates when the additional storage would be available under climate change conditions.
3-16	See the response to Comment 1-1 regarding the inclusion of Alternatives 4 and 5 and the response to Comment 3-6 regarding the Integrated Plan Adaptive Management Group.
3-17	Section 2.4.2 of this FEIS has been revised to clarify the instream flow scenarios for using the addition storage capacity for instream flows. Section 4.2.4.2 provides more information on how those scenarios would be implemented. The revisions better explain how Reclamation would carryover the accrued water to benefit fish passage.
3-18	Section 2.4.5.2 of this FEIS has been revised to clarify that the campsites at Cle Elum River Campground would be inundated by the higher reservoir level. Flooding from the Cle Elum River in those areas causes backwater, but those areas are not part of the geomorphic floodplain and raising the berm and campground would not affect riverine processes.
3-19	The roads are subject to reservoir flooding, not Cle Elum River flooding as described in Section 2.4.5.2 of this FEIS.
3-20	Reclamation has a large stockpile of logs from all the Yakima Project reservoirs and anticipates an adequate supply. If the stockpile is not adequate or if the stockpiled logs do not meet engineering standards, Reclamation will acquire additional logs. Information about acquiring additional logs has been added to Section 2.5.3.1 and 4.7.5.3.
3-21	The drought definition for the purposes of the Integrated Plan and this FEIS is provided in Section 4.2.6.1 of this FEIS.
3-22	If Reclamation used the additional storage capacity for TWSA, it could be used for instream flows as well as irrigation water supply. For the purposes of this FEIS and the hydrologic modeling, Reclamation assumed the additional storage capacity would be used for irrigation water supply under Alternatives 4 and 5. This represents a “worst-case” scenario for fish. This has been clarified in Sections 4.2.6.2 and Section 4.6.6.2.
3-23	The description of use of the additional storage capacity for instream flows in Sections 2.4.2 of this FEIS has been revised to clarify the timing of flow releases. Section 4.2.4.2 provides more detail on the timing of flow releases and Section 4.6.4.2 describes the effects of the timing on fish.
3-24	Reclamation has been operating the interim fish passage facility since 2005 while reserving reservoir capacity for flood control. This would not change with the Cle Elum Pool Raise Project. Reclamation would still be able to operate the interim fish passage facility and reserve capacity in the reservoir for flood control. The minimum elevation for operation of the permanent fish passage facilities is 2,180. Sections 4.2.4.2 and 4.6.4.2 (Scenario 4) describe the effects of using the additional storage capacity to achieve that elevation.

3-25	An impact indicator (Section 4.2.1) and a new instream flow scenario for increasing summer flows (Section 2.4.2, Scenario 3) have been added to this FEIS.
3-26	Section 4.2.4.1 of the FEIS has been revised to clarify the additional storage fills in spring and early summer.
3-27	Section 4.2.2.1 has been revised to describe reservoir operation with the additional storage capacity. New instream flow scenarios have been added to Section 4.2.4.2 to more clearly define how Reclamation would release the accrued water. While releases from the reservoir might be reduced in the spring when the reservoir is filling up to the higher level, Reclamation would continue to meet the instream flow targets. If it is not possible to meet the instream flow targets in order to fill the reservoir to elevation 2,243, Reclamation would not fill the reservoir to the higher level.
3-28	Comment noted. Reclamation will continue to work with SOAC to determine how flows should be released from the reservoir. See the response to Comment 3-27.
3-29	The discussion in Section 4.2.4.1 is not a comparison between seasons. The text states that during late spring or early summer when the additional storage capacity is filling, flows in the Yakima River are high. Therefore, the reduction in flows to fill the reservoir would be a small percentage of river flows. The increase in flow from the additional storage capacity, if released in winter, would be relatively greater because flows in the Cle Elum River during winter can be in the 180 to 220 cfs range. Section 4.2.4.2 has been revised in this FEIS to better describe how Reclamation would use the additional storage capacity for instream flows. Scenario 1 describes the effect on winter flows.
3-30	Section 4.2.4.2 describes the effect of using the additional storage capacity for instream flows and Section 4.2.6.2 describes the effects of using the accrued water for TWSA. Both sections have been revised in this FEIS to describe the effects on reaches of the Yakima River, including the Roza reach.
3-31	See the response to Comment 3-30.
3-32	Section 4.2.6.2 of this FEIS has been revised to better describe the effects of using the additional storage capacity for instream flows. Section 4.6.4.2 describes how these flows would affect fish.
3-33	Section 4.6.2 of this FEIS has been updated to clarify the low flow conditions that occur in winter and the smolt outmigration period.
3-34	See the response to Comment 3-11.
3-35	Additional instream flow scenarios have been added to Section 2.4.2 in this FEIS. Section 4.2.4.2 has been revised to better describe how the additional storage capacity would be used to improve instream flows. Section 4.6.4.2 has been updated to describe the effects of these flow scenarios on fish.
3-36	See the response to Comment 3-35.
3-37	Section 4.6.4.2 of this FEIS has been revised to reflect operational flexibility that would reduce low flow scenarios during spring. Filling could occur during periods outside of the smolt outmigration window and therefore minimize any potential impacts.
3-38	Section 4.9.2 of this FEIS has been revised to clarify the negative impacts under

	Alternatives 4 and 5.
3-39	Section 4.24.1.2 has been revised to clarify that water management practices have altered riverine and floodplain ecosystems.

Comment Letter No. 4 – U.S. Fish and Wildlife Service

4-1	Comment noted. Your comment matrix is attached.
4-2	See the response to Comment 3-5 regarding including the ongoing ESA consultation on the Yakima Project Operations and Maintenance in this FEIS.
4-3	Under the No Action Alternative, existing reservoir operations and existing streamflow conditions would continue and SOAC's role in advising Reclamation on instream flows would continue as it is currently. Section 2.4.2 and Section 4.2.4.2 of this FEIS have been revised to better describe how the additional storage capacity would be used to benefit instream flows. Scenario 4 describes how the additional storage capacity would be used to benefit downstream fish passage. SOAC's role is described in Section 2.4.2 of this FEIS.
4-4	The impacts of shoreline protection measures and design and mitigation measures to reduce those impacts are described in Chapter 4. See especially Sections 4.2, 4.3, 4.4, and 4.6.
4-5	As described in Section 4.6.8, Reclamation would coordinate with WDFW, the Service and NMFS to develop a monitoring program to evaluate stranding, dewatering, or fish passage blockage associated with the Cle Elum Pool Raise Project. For this FEIS, Reclamation has added the Service and NMFS as agencies that would be involved in the evaluation.
4-6	The minor improvement in tributary accessibility is described in Section 4.6.4.1: "For tributaries entering the reservoir, spawning habitat would be the same or slightly increased access because the shift in pool elevation would increase the depth of water from the baseline throughout the reservoir and at tributary mouths."
4-7	As stated in the FEIS, Reclamation will also coordinate with the Service to develop appropriate mitigation measures if fish passage barriers are formed. See Sections 4.6.8 and 4.9.8 of the FEIS. Because the nature and extent of any fish passage blockage has not been identified at this time, Reclamation will develop measures in coordination with the Service and WDFW to address the problems if they occur.
4-8	Comment noted.
4-9	Additional information about northern spotted owl habitat has been added to Section 4.9.4.1 of this FEIS.
4-10	As described in Sections 4.6.8 and 4.9.8, Reclamation would coordinate with WDFW and the Service to develop appropriate mitigation measures if passage problems are identified.
4-11	Section 4.6.4.1 provides information on improvements to reservoir productivity and habitat complexity with citations to relevant literature.
4-12	Section 4.9.4.2 has been revised to clarify the benefits to bull trout from improved streamflows downstream from the dam.
4-13	Additional information on northern spotted owl habitat and presence has been added to Section 4.9 of the FEIS.

Comment Letter No. 5 – Washington Department of Fish and Wildlife

5-1	Comment noted.
5-2	Comment noted.
5-3	Your comments in support of using the additional storage capacity for fish passage are noted. Additional instream flow scenarios have been added to Section 2.4.2 and 4.2.4.2 of this FEIS. One of the scenarios describes using the additional storage capacity to benefit operation of the permanent fish passage facility. The Fish Passage Operations Agreement is still in draft stage and is a separate process from the Cle Elum Pool Raise Project. Therefore, it is not appropriate to include it as an appendix to this EIS.
5-4	Comment noted. Reclamation will continue to work with WDFW and other fishery co-managers to manage instream flows. As described in Section 4.6.8, Reclamation would coordinate with WDFW, the Service, and NMFS to develop a monitoring program that would include monitoring how the Proposed Action affects habitat in the Cle Elum River.
5-5	Comment noted. Your comment table is attached.
5-6	Bull trout enhancement and the Bull Trout Memorandum of Understanding between Reclamation, Ecology, the Yakama Nation, the Service, USFS, and WDFW are not part of the Cle Elum Pool Raise Project. Bull trout enhancement is being implemented as part of the Kachess Drought Relief Pumping Plant and Keechelus-to-Kachess Conveyance Projects and is included as an appendix to that EIS.
5-7	Section 4.6.4.1 of this FEIS includes a discussion of potential impacts to spawning habitat. As noted the higher reservoir level would not affect sockeye spawning because their spawning occurs in the fall when the reservoir level is low and would continue to be low at that time under the Proposed Action.
5-8	Chapter 2 has been revised to clarify the location of access roads. As described, Reclamation would utilize existing roads or the dry reservoir bed to the extent possible. This would minimize the potential impacts of access roads. New access road would be required for construction at Saddle Dike 1 (Section 2.4.5.2). Impacts of the access roads are discussed in Chapter 4 (see especially sections 4.3, 4.4, 4.6, 4.7, and 4.8). All construction would take place above water level and BMPs would be used to minimize potential impacts. As stated in Section 2.4.3.3, if the location of access roads, staging areas, or clearing change, Reclamation will conduct the appropriate environmental review and compliance.
5-9	Figure 2-9 has been added to this FEIS to illustrate the areas that would be cleared. Potential impacts of clearing are described in Section 4.7.
5-10	Section 4.6 describes impacts of the Proposed Action on reservoir habitat. Reclamation has selected Alternative 3 as the Preferred Alternative. The hybrid shoreline protection proposed in that alternative includes perched beaches and other bioengineered shoreline protection measures that would minimize impacts to shoreline habitat.
5-11	Impacts to lake trout and kokanee are described in Sections 4.6.3 and 4.6.6.1. Table 2.9 has been revised to clarify. The period of increased flows under Alternative 2 are described in Section 4.2.4.2.

5-12	See Section 4.6.4.2 for additional explanation.
5-13	Section 4.6.4.2 describes impacts to fish from lower flows in the spring.
5-14	As described in Section 4.9.8, Reclamation would conduct preconstruction surveys for listed fish and wildlife species.
5-15	Comment noted. Section 4.9.4.2 states that bull trout potentially use the upper Yakima River and discusses potential benefits to this fish.
5-16	Section 3.2 has been revised to describe reaches of the Yakima River downstream from Cle Elum Reservoir. Section 4.2.4.2 describes how using the additional storage capacity for instream flows would affect Yakima River reaches. The Cle Elum Pool Raise Project would not change flows in the Naches River and its tributaries.
5-17	Sections 4.4.4.1, 4.4.4.2, and 4.4.6.2 discuss temperature impacts to the reservoir and Cle Elum River.
5-18	This information has been used to update the number of sockeye returns in Section 3.6.
5-19	This information has been added to Section 3.8.1 of this FEIS.
5-20	This information has been added to Section 3.9.3 of this FEIS.
5-21	This correction has been made in Section 3.9.4.3 of this FEIS.
5-22	Reclamation, in consultation with WDFW, determined that the Cle Elum Pool Rise Project would not affect recreation facilities at Bell Boat Launch. As noted in Section 4.14.4.5 of this FEIS, Reclamation would coordinate with WDFW to maintain access to the Bell Boat Launch facilities during construction of shoreline protection for Salmon La Sac Road.
5-23	This has been added to Section 4.3.8 of this FEIS.
5-24	Impacts to bull trout are described in Section 4.9. Section 4.6.4.1 describes tributary passage issues.
5-25	See the response to Comment 5-7 regarding impacts to spawning habitat.
5-26	Impacts to wildlife from loss of woody vegetation are discussed in Section 4.8.
5-27	Section 4.7.4.3 of this FEIS has been revised to acknowledge presence of littoral wetlands in rock shoreline protection footprint.
5-28	Section 4.7.4.1 has been updated to discuss impacts to goldenaster. Section 3.7 and Appendix D have been updated to include WDFW observations.
5-29	Potential impacts to wildlife, including nesting birds, from additional inundation are described in Section 4.8.4.2. As described in Section 4.7.8, Reclamation would conduct wetland surveys prior to construction and would design shoreline protection measures to avoid wetland impacts. If wetlands are impacted, Reclamation would comply with mitigation measures established in permit conditions.
5-30	Section 4.9.4.2 has been revised to clarify the benefit.
5-31	Section 4.2.4.2 of this FEIS has been revised to describe additional instream flow scenarios and how those scenarios would affect habitat downstream from the reservoir. Section 4.6.4.2 describes the duration of flow benefits for these scenarios.
5-32	Section 4.9 has been revised to clarify that while grizzly bears and gray wolves are known to be in the area (see Section 3.9.4), they are unlikely to be impacted

	by the projects
5-33	Section 4.9.4.2 has been revised to clarify that northern spotted owl are not likely to be affected by construction noise because none are likely to be close enough to construction to be disturbed.
5-34	This has been added to the list of environmental commitments in Section 4.29 of this FEIS.
5-35	This has been added to the list of environmental commitments in Section 4.29 of this FEIS.
5-36	Section 4.12.3 has been revised to clarify the climate change impacts under No Action.
5-37	Information has been added to Section 4.7.8 to clarify that Reclamation would survey vegetation in the shoreline protection areas prior to construction and would comply with required mitigation for loss of vegetation.
5-38	Reclamation currently works with these entities to implement habitat restoration projects and will continue to do so.
5-39	See the response to Comment 5-6 regarding bull trout enhancement.
5-40	This is included as a mitigation measures in Section 4.6.8 of this FEIS.
5-41	The Proposed Action is not expected to impact migration to tributaries, so no fish passage will be provided.
5-42	The Proposed Action will not change boat ramp access during low pool levels; therefore, the boat ramp will not be extended.
5-43	Comment noted. Reclamation and Ecology will continue to coordinate with WDFW to monitor impacts of the Cle Elum Pool Raise Project.

Comment Letter No. 6 – Washington State Department of Transportation

6-1	Comment noted.
6-2	Reclamation will comply with all requirements related to size and load limits.
6-3	Reclamation will comply with requirements to keep SR 903 and I-90 free of debris during construction and will clean up any spilled material.
6-4	Comment noted.

Comment Letter No. 7 – Kennewick Irrigation District

7-1	Comment noted.
7-2	A new instream flow scenario (Scenario 3) has been added to Section 4.2.4.2 of this FEIS. Scenario 3 describes how the additional storage capacity could be used to improve upstream adult migration. Section 4.6.4.2 describes the impacts of the flows on adult sockeye and Chinook salmon and concludes that the summer pulse flows could provide a significant benefit.
7-3	Your comments about summer pulse flows are noted. See the response to Comment 7-2 regarding benefits of summer pulse flows.
7-4	Section 4.2.4.2 has been revised to describe the effect of the instream flow scenarios on target flows at Prosser. Section 24.2.6.2 has been revised to describe how using the additional storage capacity for TWSA would affect target

	flows at Prosser. Reclamation would manage the Cle Elum Pool Raise Project so that it would not impact water delivery contracts, including KRD's water right.
7-5	Your comments about using the additional storage capacity for TWSA not benefiting KID's water supply are noted. Reclamation and Ecology have identified Alternative 3, which would use the additional storage capacity for instream flows, as the Preferred Alternative.

Comment Letter No. 8 – American Rivers, Trout Unlimited, The Wilderness Society

8-1	Comment noted.
8-2	Your support for Alternative 3 is noted. Reclamation and Ecology have selected it as the Preferred Alternative.
8-3	Comment noted.
8-4	Section 4.2.4.2 has been revised in this FEIS to describe additional instream flow scenarios. As noted in Section 4.2.4.2, Reclamation would manage the additional storage capacity in consultation with SOAC. See the response to Comment 3-6 regarding future involvement of the Integrated Plan Adaptive Management Group.
8-5	Sections 3.2 and 4.2.4.2 of this FEIS have been revised to better describe existing flows.
8-6	Your support of hybrid shoreline protection is noted. Reclamation and Ecology have selected Alternative 3, which includes hybrid shoreline protection, as the Preferred Alternative.
8-7	Sections 4.6.8 and 4.9.8 in the FEIS have been revised to clarify that construction would comply with applicable fish windows to minimize impacts.
8-8	Your comments about mitigation are noted. Reclamation will comply with mitigation requirements in applicable permits and will coordinate with fish and wildlife agencies to develop appropriate mitigation.
8-9	Comment noted.

Comment Letter No. 9 – Wise Use Movement

9-1	Your comments regarding previous water storage studies and your preference for nonstorage solutions are noted. The Yakima River Basin Integrated Water Resource Management Plan being implemented by Reclamation and Ecology contains a wide range of interrelated approaches to future water supply problems. The approaches include those that you have suggested—conservation, aquifer storage, water banking—as well as others. The Cle Elum Pool Raise project is one of the water storage solutions contained in the Integrated Plan.
9-2	See Section 1.6.4.4 of the Integrated Plan PEIS for an explanation of the *1945 Consent Decree*. The *1945 Consent Decree* established the concepts of water entitlements (nonproratable and proratable) and TWSA (Section 1.4.2 of this FEIS). Stored water can be used for instream purposes during drought years and not breach the obligations to supply nonproratable and proratable water users because instream use is designated to specific stream reaches and can still be used for irrigation supply or can be used instream by agreement between the

	holder and the beneficiaries of the water right.
9-3	As described in Section 2.5.4 of the Integrated Plan PEIS, Reclamation and Ecology have evaluated reliance on water conservation to contribute to instream and out-of-stream water needs in the Yakima River basin. The Integrated Plan and Reclamation's Record of Decision on the Integrated Plan PEIS include water conservation projects. Those projects are complimentary to the Cle Elum Pool Raise Project and are not alternatives to it.
9-4	As you note, Section 4.18 includes a cost analysis of the Cle Elum Pool Raise alternatives. This is part of the NEPA evaluation of socioeconomic impacts. A cost comparison with water conservation is not included because conservation is not an alternative the Cle Elum Pool Raise Project. See the response to Comment 9-3 regarding implementation of conservation projects under the Integrated Plan.
9-5	Project-level cumulative impacts of the Cle Elum Pool Raise Project are evaluated in Section 4.24 of this EIS. That section defines the criteria used for including projects in the cumulative impacts analysis. Reclamation and Ecology identified two projects from the Integrated Plan that meet those criteria—Keechelus to Kachess Conveyance (KKC) and Kachess Drought Relief Pumping Plant (KDRPP). The other projects included in the Integrated Plan do not meet the criteria for consideration in the project-level evaluation of cumulative effects.
9-6	Reclamation and Ecology believe the No Action Alternative and action alternatives provide an appropriate and reasonable range of alternatives as necessary to understand the effects of the Proposed Action and to reduce potential adverse consequences. See the response to Comment 1-1 regarding inclusion of using the additional storage capacity for TWSA. See the response to Comment 9-3 regarding inclusion of water conservation as an alternative to the Proposed Action.
9-7	Cle Elum Reservoir has the largest storage capacity of the Yakima Project reservoirs and is the main resource for meeting irrigation demands. Section 3.2.2 provides additional information about how Cle Elum Reservoir meets irrigation demands.
9-8	Section 2.4.1 has been revised to describe how Reclamation would comply with the Safety of Dams Program. Section 4.3.4.1 has been revised to include a description of potential seismic risks associated with the Cle Elum Pool Raise Project and to include conclusions from the *Geological and Geotechnical Analysis for the Modification Decision Analysis of the Cle Elum Dam* that you mention. That analysis concluded that the 3-foot pool raise would not affect the failure potential of the dam.
9-9	This has been added to Section 1.4.1.
9-10	Incorporation by reference of the Integrated Plan PEIS meets the requirements of NEPA and adoption of the Integrated Plan meets the requirements of SEPA as described in Sections 1.6.1 and 1.6.2 of this EIS. The conditions and effects described in the Integrated Plan PEIS are still valid. See the responses to Comments 9-3 and 9-6 regarding alternatives to the Cle Elum Pool Raise Project.
9-11	Preparation of the benefit-cost analysis for the Integrated Plan is a separate

	requirement of the Washington State Legislature. It is not part of the authorization for implementation of the Integrated Plan. The analysis was completed in December 2014 and presented to the Integrated Plan Workgroup at its January 2015 meeting. The benefit-cost analysis was prepared for the full Integrated Plan and is not specific to the alternatives in this EIS. Reclamation and Ecology have selected Alternative 3 as the Preferred Alternative for the Cle Elum Pool Raise Project. Because the additional storage capacity would primarily benefit fish, the project is considered a nonreimbursable project and does not require a benefit-cost analysis according to Reclamation's guidance. Instead Reclamation and Ecology have prepared a least-cost analysis of the project.
9-12	Reclamation has complied with the Fish and Wildlife Coordination Act as described in Section 5.4.2. Appendix F includes the letter from the Service stating that the Coordination Act Report prepared for the Integrated Plan is sufficient to apply to the Cle Elum Pool Raise Project and that no additional Coordination Act Report is needed for the project.
9-13	See the response to Comment 1-3 regarding inclusion of the permanent fish passage in the No Action Alternative for the FEIS (Section 2.3.1).
9-14	The figures have been revised so that the elevation contours are more visible.
9-15	The section reference has been corrected in the FEIS to Section 4.2.4.1.
9-16	Your comments about shoreline protection measures are noted. The tables you refer to are now Tables 2-2 and 2-3 in the FEIS. The units of measurement for the materials used for shoreline protection are appropriate to the materials used and is comparable between the two types of shoreline protection. Figure 2-8 has been revised to more clearly show the location of shoreline protection measures. Text has been added to Section 2.4.3.1 to clarify how to locate the areas proposed for shoreline protection.
9-17	As stated in Section 2.4.3.4, Reclamation would only acquire land from willing sellers and if this is not possible, Reclamation would develop options to shoreline protection that may include avoidance or mitigation. Reclamation does not intend to use eminent domain to acquire private land.
9-18	Text has been added to Section 2.4.3.5 of the FEIS to explain that Reclamation would coordinate with the USFS and other agencies to develop appropriate measures for maintaining shoreline protection, including spraying. Exact chemicals or amounts are not known at this time, but Reclamation would minimize the use of chemicals and comply with all applicable regulations for their use.
9-19	Without the shoreline protection measures described in Section 2.4.5.2, portions of Cle Elum River Campground would be inundated by the higher reservoir level. With the measures included in Section 2.4.5.2, no impacts are expected to the campground. See Section 4.14.4.1 for additional information.
9-20	See the response to Comment 3-16. Tables 2-2 and 2-3 provide a comparison between the materials used for shoreline protection for the two alternatives. Table 2-5 of the FEIS compares the construction quantities for the two

	alternatives.
9-21	As noted in Section 2.6, additional congressional authorization would be required to use the additional storage capacity for TWSA. See the response to Comment 9-6 regarding the range of alternatives considered and Comment 1-1 regarding inclusion of using the additional storage capacity for TWSA.
9-22	Additional information on how the reservoir would be operated for both instream flows and TWSA is provided in Sections 4.2.4.2 and 4.2.6.2, respectively.
9-23	The proratable districts would share equal priority in the allocation of water from the additional storage capacity. Reclamation would distribute the water to the districts consistent with their existing water delivery contracts. Since Reclamation and Ecology have selected Alternative 3, Additional Storage Capacity for Instream Flow with Hybrid Shoreline Protection, as the Preferred Alternative, the additional storage capacity would not be allocated to proratable irrigation districts
9-24	As described in Section 2.9.1, Reclamation determined that accessing inactive storage in the Cle Elum Reservoir was not feasible. Therefore, it is not considered as an alternative in this EIS.
9-25	As described in Section 2.9.2, Reclamation considered several options for raising the reservoir level in the 1980s. The 3-foot level was selected because it would cause fewer environmental impacts and lower costs than a higher level, but still provide enough additional storage capacity to benefit instream flows in the Cle Elum River. A 2-foot increase would not provide enough additional storage capacity to justify the costs.
9-26	Optimum instream flows for the Cle Elum River have not been calculated; however, basin biologists have stated a goal of 500 cfs for winter flow based upon their observations of flow conditions needed to keep side channels wet. However, that flow number is evolving as side channel restoration projects have been implemented that provide increased habitat at current minimum winter flow levels of 220 cfs. Any additional flow above 220 cfs would provide additional habitat and utilize side channels.
9-27	The impacts of climate change in the Cle Elum watershed are described in Sections 3.12 and 4.12 of this FEIS. As noted in Section 4.12.4, climate change would increase water temperatures and could increase the duration of temperature exceeding 21°C, which would negatively impact fish. As described in Section 4.4.4.2, the Cle Elum Pool Raise Project may result in slightly cooler outflows to the Cle Elum River, but the difference is not expected to be measurable. Therefore, the Proposed Action would not negatively impact water temperature with climate change. This Fish and Wildlife Coordination Act Report for the Integrated Plan did consider the impact of climate change on water temperature.
9-28	The impacts of the project on water temperature are described in Section 4.4 and the impacts of climate change on water temperature are described in Section 4.12. See the response to Comment 9-27. Reclamation and Ecology do not believe additional modeling of the effects on water temperature is needed because the existing information acknowledges that temperatures could increase

	above the State criterion.
9-29	Releases for TWSA under Alternatives 4 and 5 are described in Section 4.2.6.3.
9-30	Impacts to on-site sewage systems at the reservoir are discussed in Section 4.5.4.1. This section states that the higher reservoir level could cause OSS to become noncompliant with Kittitas County requirements and that Reclamation would coordinate with the property owner and Kittitas County Department of Health to reconstruct or relocate or modify the OSS if noncompliance occurs.
9-31	Impacts of shoreline protection on water quality in the reservoir are discussed in Section 4.4.4.3 and 4.4.5.3. Overall, the shoreline protection measures are not expected to affect reservoir productivity. Temporary increases in productivity could occur as fine sediments erode in the first years after the reservoir level is raised, but no long-term impacts on productivity are expected.
9-32	The sockeye reintroduction program is part of the ongoing fish reintroduction program included in the No Action Alternative (Section 2.3.1). The reintroduction program was evaluated in the *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Program EIS* (Reclamation and Ecology, 2011b) available at: http://www.usbr.gov/pn/programs/eis/cle-elum/. According to that EIS, the goal of the reintroduction program is to restore sockeye populations to self-sustaining levels capable of supporting harvest, defined as when at least 35,000 sockeye return to Cle Elum Reservoir in 10 out of 20 years. The Cle Elum Pool Raise Project is not expected to negatively affect reservoir productivity as explained in response to Comment 3-31. Therefore, the project would not negatively affect sockeye as described in Section 4.6.4.2.
9-33	Potential impacts to wetlands are described in Section 4.7. As described in Section 4.7.8, Reclamation would conduct wetland surveys using methodology accepted by permitting agencies prior to construction and would design projects to avoid wetland impacts. If wetland impacts occur, Reclamation would comply with wetland mitigation developed with the permitting agencies. Information has been added to Section 4.7.8 of the FEIS to clarify that Reclamation would work with permitting agencies to monitor impacts to wetlands from increased shoreline inundation and develop appropriate mitigation for impacts, if warranted.
9-34	See the response to Comment 9-27 and Comment 9-28 regarding the impact of climate change on water temperature.
9-35	See the response to Comment 9-24 regarding why the inactive storage proposals were not carried forward. Additional information on climate change impacts on the Proposed Action were added to Section 4.12 of this FEIS. Although climate change would cause additional storage capacity from the Cle Elum Pool Raise Project to be available less often (see Table 4-19), the project is still expected to provide a benefit.
9-36	Table 4-19 has been added to Section 4.12.4 to illustrate the starting and end dates for additional storage capacity under the effects of climate change.
9-37	Section 3.14 has been clarified whether off road vehicle (ORV) use is allowed at the reservoir. The number of tickets that the USFS has issued for ORV violations is a separate issue from the Cle Elum Pool Raise Project and that information has not been provided.

9-38	The proposed 2,243-foot elevation contour cannot be clearly shown at the scale of this figure. Refer to Figures 2-4 through 2-7 for the increased reservoir level.
9-39	Your comments related to timber harvest within the Okanogan-Wenatchee National Forest are outside the scope of this EIS and are not considered in this EIS. Conditions resulting from past land management practices in the Cle Elum watershed are included as existing conditions in Chapter 3, Affected Environment.
9-40	Figure 3-15 has been added to illustrate zoning around the reservoir.
9-41	Sections 3.14.3.2 and 4.15 of this FEIS have been revised to clarify that the Shoreline Management Program (SMP) does not apply to Federal land. As stated in Section 4.15.4.3, Reclamation would apply for appropriate permits and coordinate with Kittitas County to ensure that shoreline protection measures meet the guidelines and requirements of the SMP.
9-42	Kittitas County's revision of its SMP is outside the scope of this EIS.
9-43	See the response to Comment 9-38.
9-44	The section has been revised.
9-45	Section 4.2.4.2 has been revised to clarify how the reservoir would be drawn down. The higher water levels when the reservoir is drawn down result from carrying over storage from year to year. Reclamation would operate the reservoir to maintain an additional 14,600 acre-feet of storage that is on top of existing storage. The reservoir would not be drawn down to existing levels when the additional storage is present.
9-46	See the response to Comment 9-25 regarding why Reclamation did not consider a 2-foot pool raise.
9-47	Reclamation has not quantified the net increase in anadromous fish in the reservoir or the river from the Proposed Action. Instead, the analysis of the Cle Elum Pool Raise Project focuses on habitat improvements for anadromous fish from improved instream flows. See Section 4.6.4.2.
9-48	The fish reintroduction program described in Section 3.6.2 is part of the No Action Alternative and is expected to stay the same with or without the Proposed Action. See the response to Comment 9-32.
9-49	As described in Section 4.6.4.2, both resident and anadromous fish in the Cle Elum River would benefit from increased winter flows, especially juvenile Chinook salmon. See also Section 4.9.4.2 which describes benefits for listed bull trout and MCR steelhead.
9-50	As described in Section 4.2.4.2, the additional storage capacity would primarily benefit the Cle Elum River and would provide limited improvements in flow in the downstream portions of the Yakima River where Pacific lamprey are found.
9-51	See the response to Comment 9-45.
9-52	Table 4-4 presents the estimated increase in prorationing levels modeled for the most recent drought years as described in Section 4.2.6.2. Figure 4-4 illustrates these changes and the figure has been revised for clarity in this FEIS. The tables and figures were developed for this project using the RiverWare modeling described in Section 4.2.1.
9-53	As described in Section 4.2.6.3, the 70-percent goal for prorationing percent was developed as part of the Integrated Plan and is the level of prorationing that

	would prevent severe economic losses to irrigators. See Section 1.3 of the Integrated Plan PEIS for additional explanation of the 70-percent goal. The 50- and 60-percent levels that you suggest would not meet the 70-percent goal of the Integrated Plan and were not modeled for this EIS.
9-54	See the response to Comment 9-38.
9-55	The temperature change for Cle Elum Reservoir under the Adverse climate change scenario has not been modeled for this EIS. Section 4.12.4 acknowledges that temperatures in the rivers and reservoirs would increase under climate change and could exceed temperature thresholds for salmonids. See the response to Comment 9-27 and 9-28.
9-56	This FEIS has been revised to include the permanent fish passage facilities at Cle Elum Dam as part of the No Action Alternative (Section 2.3.1). Section 4.6.3 summarizes the benefits to salmonids from the permanent fish passage facilities which were documented in the *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project FEIS* (Reclamation and Ecology, 2011b).
9-57	The radial gates themselves would not affect wetlands. Impacts to wetlands from additional inundation are described in the Increased Reservoir Pool subsection.
9-58	As stated in Section 4.7.8, Reclamation and Ecology would coordinate with the appropriate Federal, State and local agencies to develop appropriate mitigation for impacts during permitting when the specific nature of those impacts is known.
9-59	See the response to Comment 9-56 regarding inclusion of the permanent fish passage facilities as part of the No Action Alternative for this FEIS. Sections 4.9.2 and 4.9.3 have been revised accordingly.
9-60	The No Action Alternative in Section 4.9.3 has been revised to clarify the impacts to listed species.
9-61	Section 4.9.4.2 has been revised to specifically mention bull trout overwintering in the Cle Elum River.
9-62	The section has been revised to state that shoreline protection would affect some wildlife habitat.
9-63	The statement has been deleted from Alternative 2 and moved to Section 4.12.6, Alternative 4, which includes use of the additional storage capacity for TWSA.
9-64	No information is available about the current contribution of Cle Elum River to commercial and recreational fishing; therefore, it is not possible to provide a quantitative analysis of benefits the project would provide.
9-65	See Section 4.6.4.2 regarding improvements to spawning habitat. See the response to Comment 9-49 regarding which species would benefit.
9-66	Section 4.18.4.2 of this FEIS has been modified to state that additional storage capacity would increase the areas suitable for rearing in most years, not dry years.
9-67	The project would not result in any benefits to agricultural production in Oregon because any additional storage capacity would be used by proratable irrigators in the Yakima Project. Any increases in flow downstream to the Columbia would be minimal and would not benefit irrigators in Oregon using Columbia River water.

9-68	Proratable irrigation districts would benefit from any project that increases their prorationing percentage and reduces their losses during drought years. The socioeconomic analysis in this EIS is based on the costs and benefits of the proposed Cle Elum Pool Raise Project and does not evaluate the economic impacts of other methods of increasing the prorationing percentage. See the response to Comment 9-4 regarding agricultural water conservation.
9-69	The statement has been deleted from Section 4.18.6.2. Reclamation allocates water in the Yakima River basin according to the nonproratable and proratable water rights described in Section 1.4.2.
9-70	Reclamation allocates water equally between proratable irrigation districts. The districts allocate the water to individual members within the district boundaries based on rules of each district.
9-71	Because no quantitative data on subsistence fishing exists, the discussion was removed from Section 4.22.
9-72	Although the Cle Elum Pool Raise Project was authorized by Congress in 1994 (Sections 1.4.3 and 2.1 of this FEIS), the project has not received congressional appropriation of funding for construction.
9-73	See the response to Comment 9-56.
9-74	The information you request about forest practices in the Okanogan-Wenatchee National Forest is outside the scope of this EIS and is not provided. See the response to Comment 9-39.
9-75	Section 4.24.1.2 of this FEIS summarizes the cumulative impacts of past water management practices. As stated in the section, those impacts are described as the baseline condition in Chapter 3, Affected Environment.
9-76	See the response to Comment 9-39 regarding USFS forest practices. Implementation of the Forest Plan Revision is not currently scheduled (see http://www.fs.usda.gov/detail/okawen/landmanagement/planning/?cid=fsbdev3_053639); therefore, it is not considered reasonably foreseeable and is not included in the cumulative impacts analysis. USFS would analyze the impacts of the Forest Plan Revision in a separate NEPA EIS prior to implementation.
9-77	The permanent fish passage facilities for Cle Elum Dam are currently in the final design process being undertaken by Reclamation's Technical Service Center in Denver. Reclamation is basing its design on accepted fish passage technology. Impacts of the Fish Passage facilities are described in the *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction FEIS* (Reclamation and Ecology, 2011b). This FEIS has been revised to include the permanent fish passage facilities as part of No Action alternative and combined impacts of the two projects are included in appropriate resource sections of Chapter 4.
9-78	See the response to Comment 9-5 regarding cumulative impacts of proposed Integrated Plan projects.
9-79	Comment noted. This EIS evaluates the potential impacts associated with the proposed Cle Elum Pool Raise Project. See the response to Comment 9-5 regarding NEPA and SEPA evaluation of other Integrated Plan projects.
9-80	See the responses to Comment 9-6 regarding evaluation of alternatives and comment 9-2 regarding the 1945 Consent Decree.

9-81	This FEIS is a combined NEPA and SEPA document and meets the requirements of both NEPA and SEPA (see Section 1.6 of this FEIS). SEPA regulations allow the combination of documents and do not require that separate documents or responses to comments be prepared (WAC 197-11-640).
9-82	You are included on the distribution list for this FEIS.

Comment Letter No. 10 – Alpine Lakes Protection Society

10-1	Comment noted.
10-2	See Section 4.7.8 of this FEIS regarding mitigation for loss of vegetation from the increased reservoir inundation.
10-3	See the responses to Comment 9-5 regarding evaluation of cumulative impacts; Comment 9-4 regarding conservation as an alternative, and Comment 9-6 regarding alternatives to the Proposed Action. See the response to Comment 9-11 regarding cost analysis for the Proposed Action. Because water conservation is not an alternative to the Proposed Action, no cost comparison is provided.
10-4	See the response to Comment 9-10 regarding incorporation by reference and adoption of the Integrated Plan FPEIS.
10-5	See the response to Comment 9-12 regarding Fish and Wildlife Coordination Act compliance.
10-6	See the response to Comment 9-2 regarding the 1945 Consent Decree.
10-7	Comment noted.
10-8	Comment noted.
10-9	Comment noted.
10-10	Comment noted.
10-11	See Table 2-5 for a summary of the amount of excavation and fill required for hybrid shoreline protection, the Preferred Alternative. Reclamation anticipates that most of the material excavated for shoreline protection would be reused and would not need to be disposed of offsite.
10-12	Proposed shoreline protection on the west side of the reservoir is described in Section 2.4.5.1 of this FEIS and the location of the protection is shown on Figure 2-8.
10-13	Comment noted.
10-14	Comment noted. See the response to Comment 9-11 regarding the Water Research Center's cost-benefit analysis.
10-15	See the response to comment 9-81 regarding separate NEPA and SEPA responses.
10-16	Comment noted. See the response to Comment 9-5 regarding NEPA and SEPA evaluation of other projects proposed in the Integrated Plan.
10-17	You are included on the distribution list for this FEIS.

Comment Letter No. 11 – North Cascades Conservation Council

11-1	Comment noted.
11-2	See the responses to Comments 10-2 through 10-16.

11-3	You are included on the distribution list for this FEIS.

Comment Letter No. 12 – Yakima Audubon Society

12-1	Commented noted.
12-2	Section 4.2.4.2 has been revised in this FEIS to add additional scenarios for using the additional storage capacity for instream flows. As stated in Section 4.2.4.2, Reclamation anticipates that the use of additional storage capacity for instream flows would change depending on flow needs. For that reason, Reclamation would manage the additional storage capacity with the advice of SOAC to maximize benefits to instream flows.
12-3	The proposed permanent fish passage facilities have been added as a No Action Alternative project to the FEIS. See the response to Comment 1-3. Reclamation and Ecology evaluated the impacts of the fish passage facilities in *Cle Elum Dam Fish Passage Facilities and Fish Reintroduction FEIS* (Reclamation and Ecology, 2011b).
12-4	See the response to Comment 9-4 regarding water conservation as an alternative to the Proposed Action.
12-5	See the response to Comment 9-33 regarding wetland impacts.
12-6	Potential impacts of erosion on shoreline areas not provided with shoreline protection are described in Section 4.3.4.2 of this FEIS. Reclamation would continue its existing shoreline inventory program to monitor and protect against erosion problems as described in Section 2.4.3.5.
12-7	Improvement of temperature and nutrient conditions in Cle Elum Reservoir is outside the scope of the Proposed Action. As described in Section 4.4, the Proposed Action is not expected to cause water temperature or long-term nutrient impacts.
12-8	Comment noted. Reclamation and Ecology have used the Ecology and EPA threshold for significance of greenhouse gas emissions (Section 4.12.1 of this FEIS).
12-9	Comment noted.

Comment Letter No. 13 – Yakima Basin Storage Alliance

13-1	Comment noted.
13-2	See the response to Comment 9-11 regarding cost-benefit analysis for the Cle Elum Pool Raise Project.
13-3	See the response to Comments 9-3 and 9-6 regarding conservation and alternatives to the Proposed Action.
13-4	Comment noted. As described in Section 4.2.4.2 of this FEIS, the additional storage capacity would provide significant benefits to instream flows in the Cle Elum River.
13-5	Comment noted. Section 4.2.6.2 states that using the additional storage capacity for TWSA would provide a small positive benefit to water supply reliability for proratable water users. Reclamation and Ecology have selected Alternative 3 –

	Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection as the Preferred Alternative.
13-6	Section 4.12.4 has been revised to better describe the availability of the additional storage capacity under modeled climate change scenarios. See Sections 4.12.4 and 4.12.6. The higher reservoir pool would fill in 5 out of the 81 years of simulation under the Adverse climate change scenario. However, the higher reservoir pool is simulated to be 3 feet higher (or more) than the no action conditions under Adverse climate conditions, during 26 out of the same 81 years. Compared to the No Action Alternative under Adverse climate change, the maximum annual Cle Elum pool level is simulated to average 2.1 feet higher with the Cle Elum Pool Raise Project.
13-7	Comment noted. The Integrated Plan includes a study of the Columbia River Pump Exchange. As described in Section 2.4.5.4 of the Integrated Plan PEIS, implementation of the Integrated Plan will be periodically evaluated. If the evaluation indicates that additional water supply is needed to meet the goals of the Integrated Plan and the feasibility study indicates that a pump exchange is feasible, a Columbia River Pump Exchange could be considered.
13-8	Comment noted. Basin fisheries biologists have determined that improved streamflows are needed in the Cle Elum River during winter to improve access to side channels. This would benefit spring Chinook rearing in the Cle Elum River (see Section 4.6.4.2 of this FEIS).
13-9	Both the interim fish passage facilities and the proposed permanent fish passage facilities would provide fish passage at the dam. However, as stated in the response to Comment 13-8, additional flows in the Cle Elum River are also needed to improve aquatic resources.
13-10	Comment noted. Reclamation and Ecology have selected Alternative 3 – Additional Storage Capacity for Instream Flow and Hybrid Shoreline Protection as the Preferred Alternative.

Comment Letter No. 14 – Martin Durkin, Jr.

14-1	Reclamation will coordinate with you and other landowners affected by the increased reservation inundation to develop the most appropriate shoreline protection for your property. Reclamation will not increase the reservoir level before shoreline protection measures have been installed on affected private property.

Comment Letter No. 15 – Phelps Freeborn

15-1	Your comments about the quantitative data presented in this FEIS are noted. While it is typical of professional papers to report a level of certainty, including information about standard deviation, that level of detail is not appropriate for an environmental impact statement. The intended audience of an EIS is the general public and the intent of quantitative information in an EIS is to provide the reader with a sense of the magnitude and significance of impacts. As you note in your Comment 15-22, the “single numbers” used in this FEIS convey that information.

	The FEIS includes numerous text revisions that are intended to provide additional clarity and certainty where it is appropriate, and to clarify areas of uncertainty when appropriate. As described in Section 4.2.1, RiverWare is the standard model used by Reclamation to manage the Yakima Project. It has been consistently used in evaluating the impacts of projects proposed in the Yakima River basin. The RiverWare model is described briefly in Section 4.2.1 with a reference to additional information about the model in the Integrated Plan PEIS. The model uses the period 1926 to 2009 as the baseline and this covers the time period after completion of some of the irrigation projects. This has been clarified in Section 4.2.1. See also additional information about the model in response to your Comment 15-5.
15-2	Comment noted. Section 4.2.4.2 has been revised to clarify how the additional storage capacity would be used to benefit instream flows and how often those benefits would be available. Section 4.6.6.2 states that Alternatives 4 and 5 would have a negative impact on fish by decreasing winter flows.
15-3	The modeling conducted for this project includes river operations with the irrigation projects for the period from 1926 to 2009 and operations with the additional 14,600 acre-feet of storage capacity from the Cle Elum Pool Raise Project for the same time period. Reclamation did not model the flows in absence of the irrigation projects because that would not represent a realistic condition.
15-4	The importance of instream flow to spawning salmon is described in section 4.6.4.2: "For spring Chinook that spawn from August through October (Sampson et al., 2013), additional winter flows would increase the availability of spawning areas and help ensure that fall redds would not be dewatered in winter."
15-5	See the response to Comments 15-1 and 15-3. Flows are predicted based on TWSA as described in Sections 1.4.2 and 3.2.1.
15-6	All of the RiverWare modeling analysis used in this FEIS includes the period from 1926 to 2009 as described in Section 4.2.1. The analysis in Section 4.2.4 used this modeling to predict the additional storage capacity that would be available in typical years. This is described in the text and illustrated in Figures 4-1 through 4-5. The modeling does include a comparison of measured flows (from 1926 to 2009) with future flows from the additional storage capacity.
15-7	Section 1.4.2 explains the water rights system in the Yakima River basin. Section 3.2.1 provides additional information including the instream flow targets established in Section 1205 of the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994 (Public Law 103-434), Title XII, Yakima River Basin Water Enhancement Project (108 Stat. 4550 USC). Under Alternatives 2 and 3, Reclamation would use the additional storage capacity for instream flow benefits in the Cle Elum and upper Yakima River and Reclamation would reserve that water would be reserved for instream flow use as authorized by Congress in Title XII, Yakima River Basin Water Enhancement Project legislation. See the response to Comment 3-5 regarding use of water in Cle Elum Reservoir

	to provide additional instream flows.
15-8	One of the scenarios considered in Section 4.2.4.2, is to release water during the winter after the irrigation season. Water released from other reservoirs still in storage at the end of the irrigation season would not benefit winter flows in the Cle Elum River or provide fish passage benefits in the permanent fish passage facility. It would also reduce carryover storage and potentially impact water supplies for the following year. Therefore, it was not considered as an alternative.
15-9	Sections 4.2.4.1 and 4.2.4.2 conclude that the additional storage capacity with the Cle Elum Pool Raise Projects would be a significant benefit to instream flows in the Cle Elum River and a minor benefit to streamflows in the Yakima River. See the response to Comment 15-8 regarding releasing the water after the irrigation season.
15-10	As described in Section 3.2.1.1, the 'flip-flop" operation adjusts the timing of releases from upper Yakima River and Nachess River basin reservoirs. It is not correct that Cle Elum Reservoir is drawn down to a greater degree than Kachess and Keechelus reservoirs prior to flip-flop operations. Yakima River basin fish biologists have agreed that protecting spawning areas in the upper Yakima River is a priority for protecting salmonids. See the response to Comment 15-8 regarding releasing the water after the irrigation season.
15-11	Reclamation and Ecology believe that a collaborative approach, such as the Integrated Plan is best for improving water supply and fish habitat in the Yakima River basin. Reclamation and Ecology developed the Integrated Plan in collaboration with various water and fish interest groups in the basin. The Yakama Nation has been a valuable participant in development and implementation of the Integrated Plan. Ecology does not believe that the approach you recommend would be effective in meeting the needs for water supply and fish.
15-12	Comment noted. See the response to Comment 15-11 regarding Ecology's preference for a collaborative approach. Ecology currently does not have the authority to require payment for water use and legislative action and changes to Washington State water law would be required to implement such a program.
15-13	Anticipated costs of the projects are provided in Table 2-6 (Section 2.8.2) of this FEIS. Because the primary benefits of the Preferred Alternative would occur to fish, the project is nonreimbursable and the project would be funded with Federal and State funds. Your comments about irrigators not repaying the Federal Government for the cost of the Yakima Project are noted. A discussion of repayment for irrigation projects is outside the scope of this FEIS. The primary purpose of the Yakima Project is to provide irrigation facilities for the Yakima River basin as authorized by Congress in 1905 (Section 1.4.2 of this FEIS). The Yakima Project reservoirs are operated to meet flood control needs, but their primary purpose is irrigation.

15-14	Reclamation considers the Four-county study area to be appropriate because it covers the area where the direct impacts of the Proposed Action would occur and the area encompassing the relevant markets where local economic effects would materialize. Although fewer direct impacts of the projects would materialize in Benton and Franklin counties, they contain the nearest urban center (The Tri-Cities) where many of the economic effects of the project would materialize. This study area is consistent with the study area Reclamation has used for other economic analyses related to the Yakima River basin.
15-15	The data represent employment in terms of the IMPLAN definition of a job, which includes all full-time, part-time, and temporary positions based on the annual average of monthly jobs by industry. Thus, the numbers in the table are neither total workers nor FTE, but a standard definition of a "job" that IMPLAN as well as the Bureau of Economic Analysis and Bureau of Labor Statistics use to report employment. Jobs from IMPLAN may be converted to FTE using data available from IMPLAN's website http://implan.com/index.php?option=com_content&view=article&layout=edit&id=628 The data underlying the IMPLAN model include all reported jobs and income, including those associated with migrant (and immigrant) labor.
15-16	The data in Table 3-17 are taken from the U.S. Census and are considered the most reliable information for evaluating environmental justice impacts. See Section 3.18 of the FEIS for an explanation of the data used in the IMPLAN model to generate the information displayed in Table 3-15.
15-17	Table 3-15 has been revised in this FEIS and industry categories reorganized to address data inconsistencies.
15-18	Reclamation and Ecology believe that agriculture is an important contributor to the economy of the region and the State and support continued agricultural production in the Yakima River basin.
15-19	Comment noted.
15-20	Comment noted. See the response to Comment 9-11 regarding payment for fish passage facilities and habitat improvements.
15-21	See the response to Comment 15-1.
15-22	See the responses to Comment 15-1 and 15-16.

Comment Letter No. 16 – Edward Henderson, Jr.

16-1	See the response to Comment 9-5 regarding cumulative impacts and evaluation of other project included in the Integrated Plan. See the response to Comment 9-4 regarding conservation as an alternative to the Proposed Action.
16-2	See the response to Comment 9-4 regarding a conservation alternative.
16-3	Reclamation has developed and implemented a conservation program under authority of the Yakima River Basin Water Enhancement Program, Title XII. Reclamation continues to implement YRBWEP conservation projects as described as part of the No Action Alternative of this FEIS (Section 2.3.1). In addition, Reclamation and Ecology are implementing additional agricultural

	water conservation as part of the Initial Development Phase of the Integrated Plan (Section 2.3 of this FEIS).
16-4	As stated in Section 1.2, Reclamation would seek congressional authority to redesignate the additional storage capacity for TWSA under Alternatives 4 and 5. Reclamation and Ecology have selected Alternative 3, which uses the additional storage capacity for instream flows as authorized by Congress, as the Preferred Alternative.
16-5	The statement has been deleted and Section 4.2.3 has been revised to more clearly describe the No Action Alternative.
16-6	You are included on the distribution list for this FEIS.

Comment Letter No. 17 – Dicks Kloss

17-1	Comments noted. Reclamation and Ecology believe the environmental costs of enlarging the reservoirs by the methods you suggest would be too high. Reclamation would continue its existing maintenance of the dam with no additional cost for maintaining the new radial gates. Reclamation would also continue its existing shoreline inventory program to monitor potential erosion problems on the shoreline with no additional costs. Addressing any identified erosion problems would incur additional costs, but those are not likely to be higher than the existing inventory and maintenance program.

Comment Letter No. 18 – AnnMarie Lawler

18-1	Reclamation will coordinate with you and other landowners affected by the increased reservation inundation to develop the most appropriate shoreline protection for your property. Reclamation will not increase the reservoir level before shoreline protection measures have been installed on affected private property.

Comment Letter No. 19 – Sierra Club

19-1	Comment noted.
19-2	See the responses to Comments 10-2 through 10-16.
19-3	You are included in the distribution list for this FEIS.

Comment Letter No. 20 – Yakima County Farm Bureau

20-1	Comment noted.
20-2	Your comments in support of using the additional storage capacity for TWSA are noted. However, Reclamation and Ecology have selected Alternative 3 which uses the additional storage capacity for instream flows as the Preferred Alternative as described in Section 2.2.2 of this FEIS.

Comment Letter No. 21 – Cymantha Burkle

21-1	Reclamation will coordinate with you and other landowners affected by the increased reservation inundation to develop the most appropriate shoreline protection for your property. Reclamation will not increase the reservoir level before shoreline protection measures have been installed on affected private property.

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Carpenter Memorial Library, Cle Elum
Ellensburg Public Library, Ellensburg
Kennewick Library, Kennewick
Kittitas Public Library, Kittitas
Mid-Columbia Library, Kennewick
Pasco Library, Pasco
Prosser Library, Prosser
Richland Public Library, Richland
Roslyn Public Library, Roslyn
Sunnyside Public Library, Sunnyside
Toppenish Library, Toppenish
Wapato Library, Wapato
Washington State Library, Olympia
West Richland Library, Richland
Yakama Nation Library, Toppenish
Yakima Valley Regional Library, Yakima

Organizations

Alpine Lakes Protection Society, Seattle
American Rivers, Tacoma
American Whitewater, Seattle
Aqua Permanente, Ellensburg
Atlantic States Legal Foundation, Inc., Syracuse, New York
Backcountry Horsemen of Washington, Thorp
Center for Environmental Law and Policy, Spokane
Center for Biological Diversity, Washington DC
Central Washington Resource Energy Collaborative, Ellensburg
Columbia River Intertribal Fish Commission, Portland, Oregon
Conservation Northwest, Seattle
EcoNorthwest, Eugene, Oregon
El Sendero Backcountry Ski and Snowshoe Club, Wenatchee
FFF Steelhead Committee (email)
Federation of Western Outdoor Clubs, Molalla, Oregon
Forterra, Seattle
Friends of the Teanaway, Cle Elum
Friends of Wild Sky, Duvall
Heart of America Northwest, Seattle
Kittitas Conservation Trust, Roslyn
Kittitas County Chamber of Commerce

League of Women Voters, Yakima
North Cascades Conservation Council, Seattle
Olympic Forest Coalition, Quilcene
Sierra Club, Seattle
The Wilderness Society, Seattle
Trout Unlimited, Wenatchee
Washington Water Trust, Ellensburg
Water District #2, Ronald
Western Lands Project, Seattle
Western Water Futures LLC, Seattle
Wise Use Movement, Seattle
Yakima Basin Fish and Wildlife Recovery Board, Yakima
Yakima Basin Joint Board, Sunnyside
Yakima Basin Storage Alliance, Yakima, Zillah
Yakima County Farm Bureau, Wapato
Yakima Valley Audubon Society, Yakima
Yakima Valley Conference of Governments, Yakima

Individuals

Keith Baldwin, Bellevue
James Ball, Renton
Max Benitz, Prosser
Mary Bergstrom, Cle Elum
DM Bierek, Cle Elum
Wayne Blair, Renton
Eldon Broughton, Moses Lake
Barry Brunson, Cle Elum
Mary Burke, Fox, Oregon
Bob Burkle, Elma
Jay and Nancy Burnham, Auburn
Michael L. Burns, Issaquah
William Campbell, Easton
Thomas Carmody, Issaquah
Robert Cernick, Cle Elum
Roger Clerf, Cle Elum
Nicola Coluccio, Seattle
Michael W. Daniels, Woodinville
Alvin Danielson, Redmond
James Davenport, Buena
Marc Denton, Portland, Oregon
Katherine Desgrosellier, Seattle
K.S. Diamond, Redmond
Martin Durkan, Maple Valley
Lauren DuRocher, Cle Elum
Jack and Benitta Eaton, Ellensburg
William L. Fleury, Seattle

Phelps Freeborn, Yakima
Carll R. Frye, Bellevue
Steven Fury, Seattle
Lon Paul Gienger, Yakima
Mr. and Mrs. Hamberlin, Ronald
Ken Hammond, Ellensburg
Edward M. Henderson, Jr., Seattle
Mike Hoban, Cle Elum
Dan Howard, Monroe
David Kaumheimer, Selah
Katherine Kearny, Kenmore
Pat Kelleher, Ellensburg
Leilia Kloes, Snohomish
Dick Kloss, Cle Elum
Anthony Lambregts, Bellevue
Stephen and Ann Lawler, Kirkland
Nancy Lawton, Seattle
Barry Marmorstein, Ronald
John Maryanski, Auburn
John W. McGee, Des Moines
Donald N. McGugin, Ronald
Mary Beth Medrano, Selah
Dan Merlino, Seattle
Eric Mueller, Seattle
Richard R. Mundy, Ellensburg
Bryan Myre, Yakima
Cindy Peach, Ronald
Onni Perala, Apache Junction, Arizona
John Plesha, Ronald
Carl Rautenberg, Edmonds
Bill Rochester, Ronald
John Rohrbach, Sammamish
Michael Rothkugel & Jay Nelson, Bothell
Paige & Scott Ryan, Carmel, IN
James Schwartz, Seattle
Dan Silver, Olympia
Kevin Silver, San Jose, CA
Mitchel Storey, Seattle
Gilles Toussaint, Black Diamond
Helen Tyler, Yakima
Margaret VanCleve, Selah
Anne Watanabe, Roslyn
Lawrence Williamson, Federal Way
Kathie Wise, Bonney Lake
Jon Yoder, Pullman
Ron and Beverly Zaremba, Goldendale

Business Entities

Encompass Engineering and Survey, Cle Elum
J&D's Hydraulic and Repair, Auburn
Normandeau Associates, Seattle
Yakima Auto Dealers, Yakima

Media

Ellensburg Daily Record, Ellensburg
North Kittitas County Tribune, Cle Elum
Tri-City Herald, Tri-Cities
Yakima Herald Republic, Yakima

GLOSSARY

GLOSSARY

acre-foot	The volume of water that could cover 1 acre to a depth of 1 foot. Equivalent to 43,560 cubic feet or 325,851 gallons.
active capacity	The portion of the reservoir that can be released to augment instream flows and to be delivered to irrigators,
alluvial	Composed of clay, silt, sand, gravel, or similar material deposited by running water.
anadromous	Fish that hatch and develop to adolescence in rivers and migrate to saltwater to feed, then migrate from saltwater to freshwater to spawn.
benthic	Relating to the bottom of a sea or lake or to the organisms that live there.
cfs	Flow rate in cubic feet per second.
Cle Elum datum	Elevations at Cle Elum Reservoir are based on Reclamation's local datum established when the dam was constructed. Elevations do not correspond to standard datum. The Cle Elum datum is approximately 5.4 feet below the NAVD88 datum.
cobbles	Rounded rock with a particle size between 2.5 and 1 inches.
cumulative effect	For NEPA purposes, these are impacts to the environment that result 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 action.
Endangered species	Under the Endangered Species Act, a species that is in danger of extinction throughout all or a significant portion of its range. To term a run of salmon "endangered" is to say that particular run is in danger of extinction.
Environmental Justice	The fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that there is equity of the distribution of benefits and risks associated with a proposed project and that one group does not suffer disproportionate adverse effects.

Eutrophication	The process by which a body of water becomes enriched in dissolved nutrients that stimulate the growth of aquatic plant life, usually resulting in the depletion of dissolved oxygen.
Fascines	A rough bundle of brushwood or other material used for strengthening an earthen structure.
Flip-flop	An operational action in the upper Yakima River basin in late summer to encourage anadromous salmon to spawn at lower river state levels so that the flows required to keep the redds watered and protected during the subsequent incubation period are minimized.
Flow	The volume of water passing a given point per unit of time.
Freeboard	Freeboard is a factor of safety usually expressed in feet above a flood level. In this case, it is a 3-foot zone of additional protection from wave erosion.
Grub	Remove stumps and roots to provide a firm surface for embankments.
Habitat	The combination of resources and the environmental conditions that promotes occupancy by individuals of a given species and allows those individuals to survive and reproduce.
Historic property	Any building, site, district, structure, or object (that has archeological or cultural significance) included in, or eligible for inclusion in, the National Register.
Hydrogeomorphic processes	The science relating to the geographical, geological, and hydrological aspects of water bodies and changes to these in response to flow variations and to natural and human caused events.
Hydrograph	A graph showing the rate of flow or discharge versus time past a specific point in a river.
Hypolimnion	The layer of water below the thermocline.
Indian sacred site	A specific, discrete, narrowly delineated location on Federal land that is identified by an Indian Tribe or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion.

Indian Trust Assets	Legal interests in property held in trust by the United States for Indian Tribes or individuals. They are rights that were reserved by or granted to American Indian Tribes or Indian individuals by treaties, statutes, and Executive orders. These rights are sometimes further interpreted through court decisions and regulations.
Instream flows	Waterflows for designated uses within a defined stream channel, such as minimum flows for fish, wildlife, recreation, or aesthetics.
Junior water rights	Proratable water rights that, in water-short years, receive less than their full right on a prorated basis.
littoral	In the area along a freshwater shoreline.
metamorphic rock	Refers to rocks that have changed in form from their original rock type (sedimentary or igneous) in response to extreme changes in temperature, pressure, or chemical environment (i.e. limestone into marble).
nonproratable water rights	Pre-Yakima Project senior water rights related to natural flows that are served first and cannot be reduced until all the proratable rights are regulated to zero.
oligotrophic	Lacking plant nutrients and usually containing plentiful amounts of dissolved oxygen without stratification.
Orthophosphate	A salt or ester of orthophosphoric acid, or any compound containing the trivalent group −PO 4.
palustrine wetland	A freshwater wetland dominated by rooted or nonrooted vascular and nonvascular plants, or in some instances with no vegetation.
proratable water rights	Newer junior water rights related to storage water that, in water-short years, receive less than their full right on a prorated basis.
prorationing	The process of equally reducing the amount of water delivered to junior (i.e., “proratable”) water right holders in water-deficient years.
redd	The nest that a spawning female salmon digs in gravel to deposit her eggs.
riparian	Relating to, living in, or located on a water course.
riprap	Rock material used to armor shorelines, streambeds and other shoreline structures to protect against erosion.

salmonid	A family of soft-finned fishes of cold and temperate waters that includes salmon, trout, chars, freshwater whitefishes and graylings.
sediment	Any very finely divided organic or mineral matter deposited by water in nonturbulent areas.
senior water rights	Nonproratable water rights that are served first and cannot be reduced until all the proratable rights are regulated to zero.
skid steer	Vehicular construction equipment used to load materials.
smolt	Adolescent salmon or steelhead, usually 3 to 7 inches long, that are undergoing changes preparatory for living in saltwater (see also fry and fingerling).
spawner	Adult salmon that has left the ocean and entered a river to spawn.
target flows	Flows quantified in Title XII of the Act of October 31, 1994, for two points in the Yakima River basin (Sunnyside and Prosser Diversion Dams).
terrestrial	Of or relating to land as distinct from air or water.
thermocline	A layer of water where the temperature gradient is greater than that of the warmer layer above and the colder layer below.
threatened species	Under the Endangered Species Act, a species that is likely to become endangered within the foreseeable future.
Title XII target flows	Specific instream target flows established for Yakima Project operations at Sunnyside and Prosser Diversion Dams by Title XII of the Act of October 31, 1994 (Public Law 103–464).
total water supply available (TWSA)	The total water supply available for the Yakima River basin above the Parker gage for the period April through September.
ungulate	A four-legged, hoofed animal.
unregulated flows	The flow regime of a stream as it would occur under completely natural conditions; that is, not subjected to modification by reservoirs, diversions, or other human works.
waterway	A channel for conveying or discharging excess water.

water year	The 12-month period from October through September. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. For example, the year ending September 30, 1992, is called the “1992 water year.”
watershed	The total land area draining to any point in a stream.
wetland	Generally, an area characterized by periodic inundation or saturation, hydric soils, and vegetation adapted for life in saturated soil conditions.

Appendix A

TITLE XII – YAKIMA RIVER BASIN WATER ENHANCEMENT PROJECT ENABLING LEGISLATION

P.L.103-434, Oct.31., 1994
YAKIMA RIVER BASIN WATER ENHANCEMENT PROJECT (YRBWEP)
as amended by P.L.105-62, Oct.13, 1997, and P.L.106-372, Oct.27, 2000.

Sections of the legislation relevant to the Cle Elum Pool Raise Project are Section 1205 (pages 11-14) and Section 1206 (pages 14-15)

One Hundred Third Congress
of the
United States of America
AT THE SECOND SESSION

Begun and held at the City of Washington on Tuesday, the twenty-fifth day of January, one thousand nine hundred and ninety-four

An Act

To provide for the settlement of the water rights claims of the Yavapai-Prescott Indian Tribe in Yavapai County, Arizona, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

...

TITLE XII--YAKIMA RIVER BASIN WATER ENHANCEMENT PROJECT

SEC. 1201. PURPOSES.

The purposes of this title are--

(1) to protect, mitigate, and enhance fish and wildlife through improved water management; improved instream flows; improved water quality; protection, creation and enhancement of wetlands; and by other appropriate means of habitat improvement;

(2) to improve the reliability of water supply for irrigation;

(3) to authorize a Yakima River basin water conservation program that will improve the efficiency of water delivery and use; enhance basin water supplies; improve water quality; protect, create and enhance wetlands; and determine the amount of basin water needs that can be met by water conservation measures;

(4) to realize sufficient water savings from the Yakima River Basin Water Conservation Program so that not less than 40,000 acre-feet of water savings per year are achieved by the end of the fourth year of the Basin Conservation Program, and not less than 110,000 acre-feet of water savings per year are achieved by the end of the eighth year of the program, to protect and enhance fish and wildlife resources; and not less than 55,000 acre feet of water savings per year are achieved by the end of the eighth year of the program for availability for irrigation;

(5) to encourage voluntary transactions among public and private entities which result in the implementation of water conservation measures, practices, and facilities; and

(6) to provide for the implementation by the Yakama Indian Nation at its sole discretion of (A) an irrigation demonstration project on the Yakama Indian Reservation using water savings from system improvements to the Wapato Irrigation Project, and (B) a Toppenish Creek corridor enhancement project integrating agricultural, fish, wildlife, and cultural resources.

SEC. 1202. DEFINITIONS.

As used in this title:

(1) The term `Basin Conservation Plan' means a plan for implementing water conservation measures found in the various water conservation plans developed under the Basin Conservation Program.

(2) The term `Basin Conservation Program' means the Yakima River Basin Water Conservation Program established under section 1203(a).

(3) The term `comprehensive basin operating plan' means a plan that will provide guidance to the Yakima Project Superintendent for operation of the existing Yakima Project as modified by actions taken pursuant to this title.

(4) The term `Conservation Advisory Group' means the Yakima River Basin Conservation Advisory Group established under section 1203(c).

(5) The term `conserved water' means water saved and attributable to the program established under the Basin Conservation Program.

(6) The term `Irrigation Demonstration Project' means the Yakama Indian Reservation Irrigation Demonstration Project authorized in section 1204(b).

(7) The term `nonproratable water' means that portion of the total water supply available under provisions of sections 18 and 19 of Civil Action No. 21 (Federal District Court Judgment of January 31, 1945) that is not subject to proration in times of water shortage.

(8) The term `on-district storage' means small water storage facilities located within the boundaries of an irrigation entity, including reregulating reservoirs, holding ponds, or other new storage methods which allow for efficient water use.

(9) The term `proratable water' means that portion of the total water supply available under provisions of sections 18 and 19 of Civil Action No. 21 (Federal District Court Judgment of January 31, 1945) that is subject to proration in times of water shortage.

(10) The term `Secretary' means the Secretary of the Interior.

(11) The term `System Operations Advisory Committee' means a group of fishery biologists--

(A) created by the Yakima Project Superintendent in response to the supplemental instructions entitled `Supplementary Instructions to the Water Master', and dated November 28, 1980, in the case of Kittitass Reclamation District, et al. vs. the Sunnyside Valley Irrigation District, et al. (E.D. Wash., Civil No. 21.);

(B) who advise the Yakima Project Superintendent on operations of the Yakima Project for fish and wildlife purposes; and

(C) who, together with others, were identified for consultation on November 29, 1990, in the amended partial summary judgment entered in the basin adjudication (Yakima County Superior Court No. 77-2-01484-5).

(12) The term `Toppenish Enhancement Project' means the Toppenish Creek corridor enhancement project authorized by section 1204(c).

(13) The term `Yakama Indian Nation' means the Confederated Tribes and Bands of the Yakama Indian Nation as redesignated under section 1204(g).

(14) The term `Yakima Project Superintendent' means the individual designated by the Regional Director, Pacific Northwest Region, Bureau of Reclamation, to be responsible for the operation and management of the Yakima Federal Reclamation Project, Washington.

SEC. 1203. YAKIMA RIVER BASIN WATER CONSERVATION PROGRAM.

(a) ESTABLISHMENT- (1) The Secretary, in consultation with the State of Washington, the Yakama Indian Nation, Yakima River basin irrigators, and other interested parties, shall establish and administer a Yakima River Basin Water Conservation Program for the purpose of evaluating and implementing measures to improve the availability of water supplies for irrigation and the protection and enhancement of fish and wildlife resources, including wetlands, while improving the quality of water in the Yakima Basin. The

Secretary may make grants to eligible entities for the purposes of carrying out this title under such terms and conditions as the Secretary may require. Such terms and conditions shall include a requirement that all water districts, irrigation districts, individuals, or other entities eligible to participate in the Basin Conservation Program must equip all surface water delivery systems within their boundaries with volumetric water meters or equally effective water measuring methods within 5 years of the date of enactment of this Act.

(2) Conserved water resulting in whole or in part from the expenditure of Federal funds shall not be used to expand irrigation in the Yakima Basin, except as specifically provided in section 1204(a)(3) on the Yakama Indian Reservation.

(3) The provisions of this section shall not apply to the Yakama Indian Nation except as to any funds specifically applied for from the Basin Conservation Program.

(b) FOUR PHASES OF PROGRAM- The Basin Conservation Program shall encourage and provide funding assistance for four phases of water conservation, which shall consist of the following:

> (1) The development of water conservation plans, consistent with applicable water conservation guidelines of the Secretary, by irrigation districts, conservation districts, water purveyors, other areawide entities, and individuals not included within an areawide entity.
>
> (2) The investigation of the feasibility of specific potential water conservation measures identified in conservation plans.
>
> (3) The implementation of measures that have been identified in conservation plans and have been determined to be feasible.
>
> (4) Post implementation monitoring and evaluation of implemented measures.

(c) CONSERVATION ADVISORY GROUP- (1) Not later than 12 months after the date of enactment of this Act, the Secretary, in consultation with the State of Washington, the Yakama Indian Nation, Yakima River basin irrigators, and other interested and related parties, shall establish the Yakima River Basin Conservation Advisory Group.

(2) Members of the Conservation Advisory Group shall be appointed by the Secretary and shall be comprised of--

> (A) one representative of the Yakima River basin nonproratable irrigators,
>
> (B) one representative of the Yakima River basin proratable irrigators,
>
> (C) one representative of the Yakama Indian Nation,

(D) one representative of environmental interests,

(E) one representative of the Washington State University Agricultural Extension Service,

(F) one representative of the Department of Wildlife of the State of Washington, and

(G) one individual who shall serve as the facilitator.

(3) The Conservation Advisory Group shall--

(A) provide recommendations to the Secretary and to the State of Washington regarding the structure and implementation of the Basin Conservation Program,

(B) provide recommendations to the Secretary and to the State of Washington regarding the establishment of a permanent program for the measurement and reporting of all natural flow and contract diversions within the basin,

(C) structure a process to prepare a basin conservation plan as specified in subsection (f),

(D) provide annual review of the implementation of the applicable water conservation guidelines of the Secretary, and

(E) provide recommendations consistent with statutes of the State of Washington on rules, regulations, and administration of a process to facilitate the voluntary sale or lease of water.

(4) The facilitator shall arrange for meetings of the Conservation Advisory Group, provide logistical support, and serve as moderator for the meetings.

(5) The Conservation Advisory Group shall consult an irrigation district when considering actions specifically affecting that district. For the purposes of this paragraph, an irrigation district includes the Yakima Reservation Irrigation District.

(6) The Conservation Advisory Group shall be nonvoting, seeking consensus whenever possible. If disagreement occurs, any member may submit independent comments to the Secretary. The Conservation Advisory Group shall terminate 5 years after the date of its establishment unless extended by the Secretary.

(d) COST SHARING- (1) Except as otherwise provided by this title, costs incurred in the four phases of the Basin Conservation Program shall be shared as follows:

Program Phase	Non-Federal		Federal Grant
	State Grant	Local	
1. Development of water conservation plans	50% but not more than $200,000 per recipient	(Residual amount if any)	50%
2. Investigation of specific water conservation measures	50% but sum of 1 and 2 not greater than $200,000 per recipient	20% after deducting State funds for Item 2	Residual amount after deducting State and local funds for Item 2
3 and 4. Implementation and post implementation monitoring and evaluation	17.5%	17.5%	65.0%

(2) The Yakima River Basin Water Enhancement Project is a Federal action to improve streamflow and fish passage conditions and shall be considered part of a comprehensive program to restore the Yakima River basin anadromous fishery resource. Related fishery resource improvement facilities which utilize funding sources under the Pacific Northwest Electric Power Planning and Conservation Act of 1989 (94 Stat. 2697) and independent water-related improvements of the State of Washington and other public and private entities to improve irrigation water use, water supply, and water quality, shall be treated as non-Federal cost share expenditures and shall be consolidated in any final calculation of required cost sharing. Within one year of the date of enactment of this Act, the Secretary shall enter into a binding cost sharing agreement with the State of Washington. The agreement shall describe the terms and conditions of specific contributions and other activities that may, subject to approval by the Secretary, qualify as non-Federal cost share expenditures.

(3) Costs of the Basin Conservation Program related to projects on the Yakama Indian Reservation are a Federal responsibility and shall be nonreimbursable and not subject to the cost-sharing provisions of this subsection.

(e) ENTITY WATER CONSERVATION PLANS- To participate in the Conservation Basin Program an entity must submit a proposed water conservation plan to the Secretary. The Secretary shall approve a water conservation plan submitted under this subsection if the Secretary determines that the plan meets the applicable water conservation guidelines of the Secretary.

(f) BASIN CONSERVATION PLAN- The Conservation Advisory Group shall, within 2 1/2 years after the date of enactment of this Act, submit a draft basin conservation plan to the Secretary.

(g) PUBLIC COMMENT- The Secretary shall distribute the draft basin conservation plan and the entity water conservation plans submitted under subsections (e) and (f), respectively, for public comment for a 60-day period.

(h) PUBLICATION OF BASIN CONSERVATION PLAN- Within 60 days after the close of the comment period under subsection (g), the Secretary shall publish the Basin Conservation Plan which plan will provide the basis--

> (1) for prioritizing and allocating funds to implement conservation measures under this title; and
>
> (2) for preparing an interim comprehensive basin operating plan under section 1210 of this title as provided for in Public Law 96-162 (93 Stat. 1241).

(i) CONSERVATION MEASURES- (1) Measures considered for implementation in the Basin Conservation Program may include, among others, conveyance and distribution system monitoring, automation of water conveyance systems, water measuring or metering devices and equipment, lining and piping of water conveyance and distribution systems, on-district storage, electrification of hydraulic turbines, tail-water recycling, consolidation of irrigation systems, irrigation scheduling, and improvement of on-farm water application systems. Basin Conservation Program funds may also be used throughout all four phases of the Basin Conservation Program to mitigate for adverse impacts of program measures.

(2) In addition to implementing existing technologies, the Secretary shall encourage the testing of innovative water conservation measures. The Secretary shall, to the maximum extent possible under applicable Federal, State, and tribal law, cooperate with the State of Washington to facilitate water and water right transfers, water banking, dry year options, the sale and leasing of water, and other innovative allocation tools used to maximize the utility of existing Yakima River basin water supplies.

(3) The Secretary may, consistent with applicable law, use funds appropriated to carry out this section for the purchase or lease of land, water, or water rights from any entity or individual willing to limit or forego water use on a temporary or permanent basis. Funds used for purchase or lease under this paragraph are not subject to the cost sharing provisions of subsection (d). Efforts to acquire water should be made immediately upon availability of funds to meet the three-year goal specified in section 1205(a)(4) to provide water to be used by the Yakima Project Superintendent under the advisement of the System Operations Advisory Committee for instream flow purposes. The use of Basin Conservation Program funds under this paragraph are in addition to those specifically authorized to be appropriated by subsection (j)(4).

(4) On-farm water management improvements shall be coordinated with programs administered by the Secretary of Agriculture and State conservation districts.

(j) AUTHORIZATION OF APPROPRIATIONS- There is hereby authorized to be appropriated to the Secretary, at September 1990 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuations of applicable cost indexes, the following amounts for the Basin Conservation Program:

(1) $1,000,000 for the development of water conservation plans.

(2) $4,000,000 for investigation of specific potential water conservation measures identified in conservation plans for consideration for implementing through the Basin Conservation Program.

(3) Up to $67,500,000 for design, implementation, post-implementation monitoring and evaluation of measures, and addressing environmental impacts.

(4) Up to $10,000,000 for the initial acquisition of water from willing sellers or lessors specifically to provide instream flows for interim periods to facilitate the outward migration of anadromous fish flushing flows. Such funds shall not be subject to the cost sharing provisions of subsection (d).

(5) $100,000 annually for the establishment and support of the Conservation Advisory Group during its duration. Such funds shall be available for travel and per diem, rental of meeting rooms, typing, printing and mailing, and associated administrative needs. The Secretary and the State of Washington shall provide appropriate staff support to the Conservation Advisory Group.

SEC. 1204. YAKAMA INDIAN NATION.

(a) WAPATO IRRIGATION PROJECT IMPROVEMENTS AND APPROPRIATIONS- (1) The Yakama Indian Nation's proposed system improvements to the Wapato Irrigation Project, as well as the design, construction, operation, and maintenance of the Irrigation Demonstration Project and the Toppenish Creek corridor enhancement project, pursuant to this title shall be coordinated with the Bureau of Indian Affairs.

(2) There is authorized to be appropriated to the Secretary not more than $23,000,000 for the preparation of plans, investigation of measures, and following the Secretary's certification that such measures are consistent with the water conservation objectives of this title, the implementation of system improvements to the Wapato Irrigation Project. Funding for further improvements within the Wapato Irrigation Project may be acquired under the Basin Conservation Program or other sources identified by the Yakama Indian Nation.

(3) Water savings resulting from irrigation system improvements shall be available for the use of the Yakama Indian Nation for irrigation and other purposes on the reservation

and for protection and enhancement of fish and wildlife within the Yakima River basin. The conveyance of such water through irrigation facilities other than the Wapato Irrigation Project shall be on a voluntary basis and shall not further diminish the amount of water that otherwise would have been delivered by an entity to its water users in years of water proration.

(b) IRRIGATION DEMONSTRATION PROJECT APPROPRIATIONS- (1)(A) There is hereby authorized to be appropriated to the Secretary--

(i) at September 1990 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuations of applicable cost indexes, $8,500,000 for the design and construction of the Yakama Indian Reservation Irrigation Demonstration Project; and

(ii) such sums as may be necessary for the operation and maintenance of the Irrigation Demonstration Project, including funds for administration, training, equipment, materials, and supplies for the period specified by the Secretary, which sums are in addition to operation and maintenance funds for wildlife and cultural purposes appropriated to the Secretary under other authorization.

(B) Funds may not be made available under this subsection until the Yakama Indian Nation obtains the concurrence of the Secretary in the construction, management, and administrative aspects of the Irrigation Demonstration Project.

(C) After the end of the period specified under subparagraph (A)(ii), costs for the operation and maintenance of the Irrigation Demonstration Project, including funds for administration, training, equipment, materials, and supplies referred to in that subparagraph, shall be borne exclusively by the lands directly benefitting from the Irrigation Demonstration Project.

(2) The Irrigation Demonstration Project shall provide for the construction of distribution and on-farm irrigation facilities to use all or a portion of the water savings, as determined by the Yakama Indian Nation, resulting from the Wapato Irrigation Project system improvements for--

(A) demonstrating cost-effective state of the art irrigation water management and conservation,

(B) the training of tribal members in irrigation methods, operation, and management, and

(C) upgrading existing hydroelectric facilities and construction of additional hydroelectric facilities on the reservation to meet irrigation pumping power needs.

(c) TOPPENISH CREEK CORRIDOR ENHANCEMENT PROJECT APPROPRIATIONS- There is hereby authorized to be appropriated to the Secretary $1,500,000 for the further investigation by the Yakama Indian Nation of measures to develop a Toppenish Creek corridor enhancement project to demonstrate integration of management of agricultural, fish, wildlife, and cultural resources to meet tribal objectives and such amount as the Secretary subsequently determines is necessary for implementation. There is also authorized to be appropriated to the Secretary such sums as may be necessary for the operation and maintenance of the Toppenish Enhancement Project.

(d) REPORT- Within 5 years of the implementation of the Irrigation Demonstration Project and the Toppenish Enhancement Project, the Secretary, in consultation with the Yakama Indian Nation, shall report to the Committee on Energy and Natural Resources of the Senate, the Committee on Natural Resources of the House of Representatives, and the Governor of the State of Washington on the effectiveness of the conservation, training, mitigation, and other measures implemented.

(e) STATUS OF IMPROVEMENTS AND FACILITIES- The Wapato Irrigation Project system improvements and any specific irrigation facility of the Irrigation Demonstration Project (excluding on-farm irrigation facilities) and the Toppenish Enhancement Project shall become features of the Wapato Irrigation Project.

(f) TREATMENT OF CERTAIN COSTS- Costs related to Wapato Irrigation Project improvements, the Irrigation Demonstration Project, and the Toppenish Enhancement Project shall be a Federal responsibility and are nonreimbursable and nonreturnable.

(g) REDESIGNATION OF YAKIMA INDIAN NATION TO YAKAMA INDIAN NATION-

(1) REDESIGNATION- The Confederated Tribes and Bands of the Yakima Indian Nation shall be known and designated as the `Confederated Tribes and Bands of the Yakama Indian Nation'.

(2) REFERENCES- Any reference in a law, map, regulation, document, paper, or other record of the United States to the Confederated Tribes and Bands of the Yakima Indian Nation referred to in subsection (a) shall be deemed to be a reference to the `Confederated Tribes and Bands of the Yakama Indian Nation'.

SEC. 1205. OPERATION OF YAKIMA BASIN PROJECTS.

(a) WATER SAVINGS FROM BASIN CONSERVATION PROGRAM- (1) The Basin Conservation Program is intended to result in reductions in water diversions allowing for changes in the present operation of the Yakima Project to improve stream flow conditions in the Yakima River basin. Except as provided by paragraph (5) of this subsection and section 1209, commencing with the enactment of this title, and notwithstanding that anticipated water savings are yet to be realized, the Secretary, upon the enactment of this title and acting through the Yakima Project Superintendent, shall (A) continue to estimate the water supply which is anticipated to be available to meet water entitlements; and (B) provide instream flows in accordance with the following criteria:

Water Supply Estimate for Period (million acre feet):				Target Flow from Date of Estimate thru October Downstream of (cubic feet per second):	
April thru September	May thru September	June thru September	July thru September	Sunnyside Diversion Dam	Prosser Diversion Dam
(1) 3.2	2.9	2.4	1.9	600	600
(2) 2.9	2.65	2.2	1.7	500	500
(3) 2.65	2.4	2.0	1.5	400	400
Less than line 3 water supply				300	300

(2) The initial target flows represent target flows at the respective points. Reasonable fluctuations from these target flows are anticipated in the operation of the Yakima Project, except that for any period exceeding 24 hours--

(A) actual flows at the Sunnyside Diversion Dam may not decrease to less than 65 percent of the target flow at the Sunnyside Diversion Dam; and

(B) actual flows at the Prosser Diversion Dam may not decrease by more than 50 cubic feet per second from the target flow.

(3) The instream flows shall be increased for interim periods during any month of April through October to facilitate when necessary the outward migration of anadromous fish. Increased instream flows for such interim periods shall be obtained through voluntary sale and leasing of water or water rights or from conservation measures taken under this title.

(4)(A)(i) Within the three-year period beginning when appropriations are first provided to carry out the Basin Conservation Program, the instream flow goal in the Yakima River is as follows: to secure water which is to be used for instream flows to facilitate meeting recommendations of the System Operations Advisory Committee for flushing flows or other instream uses.

(ii) In addition to any other authority of the Secretary to provide water for flushing flows, the water required to meet the goal specified in clause (i) shall be acquired through the voluntary purchase or lease of land, water, or water rights and from the development of additional storage capability at Lake Cle Elum provided for in section 1206(a).

(iii) In addition to water required to meet the instream flow goal specified in clause (i), the System Operations Advisory Committee may recommend additional water to meet instream flow goals pursuant to judicial actions.

(B) After the period referred to in subparagraph (A), such instream flow goal is modified as follows:

> (i) The goal increases so that the instream target flows specified in the table in paragraph (1) increase by 50 cubic feet per second for each 27,000 acre-feet of reduced annual water diversions achieved through implementation of measures under the Basin Conservation Program. Such increases do not apply to actions taken pursuant to section 1204. Such increases shall not further diminish the amount of water that otherwise would have been delivered by an entity to its water users in years of water proration.
>
> (ii) The goal changes directly with the availability of water resulting from Federal expenditures under this title for purchase or lease of water under this title.

(C) The Yakima Project Superintendent shall maintain an account of funded and completed conservation measures taken under the Basin Conservation Program.

(D) No later than March 31 of each calendar year, the Yakima Project Superintendent shall meet with the State of Washington, Yakama Indian Nation, and Yakima River basin irrigators to mutually determine total diversion reductions and respective adjustments to the target flows referred to in this subsection. The Yakima Project Superintendent shall announce such adjustments with the announcements of Total Water Supply Available. For the purposes of this subparagraph, conserved water will be considered available for adjusting target flows in the first year following completion of a measure or following a result from the post implementation monitoring and evaluation program, as the case may be.

(5) Operational procedures and processes in the Yakima River basin which have or may be implemented through judicial actions shall not be impacted by this title.

(6)(A) Within three years after the date of enactment of this Act, the Secretary shall conduct a study and submit a report with recommendations to the appropriate committees of the Congress on whether the water supply available for irrigation is adequate to sustain the agricultural economy of the Yakima River basin.

(B) The target flows provided for under this subsection shall be evaluated within three years after the date of enactment of this Act by the Systems Operations Advisory Committee for the purpose of making a report with recommendations to the Secretary and the Congress evaluating what is necessary to have biologically-based target flows.

(C) The recommendations and reports under subparagraphs (A) and (B) shall provide a basis for the third phase of the Yakima River Basin Water Enhancement Project.

(b) WATER FROM LAKE CLE ELUM- Water accruing from the development of additional storage capacity at Lake Cle Elum, made available pursuant to the modifications authorized in section 1206(a), shall not be part of the Yakima River basin's water supply as provided in subsection (a)(1). Water obtained from such development is exclusively dedicated to instream flows for use by the Yakima Project Superintendent as flushing flows or as otherwise advised by the System Operations Advisory Committee. Water may be carried over from year-to-year in the additional capacity to the extent that there is space available. Releases may be made from other Yakima Project storage facilities to most effectively utilize this additional water, except that water deliveries to holders of existing water rights shall not be impaired.

(c) STATUS OF BASIN CONSERVATION PROGRAM FACILITIES- Measures of the Basin Conservation Program which are implemented on facilities currently under the administrative jurisdiction of the Secretary, except as provided in section 1204, shall be considered features of the Yakima River Basin Water Enhancement Project, and their operation and maintenance shall be integrated and coordinated with other features of the existing Yakima Project. The responsibility for operation and maintenance and the related costs shall remain with the current operating entity. As appropriate, the Secretary shall incorporate the operation and maintenance of such facilities into existing agreements. The Secretary shall assure that such facilities are operated in a manner consistent with Federal and State law and in accordance with water rights recognized pursuant to State and Federal law.

(d) WATER ACQUIRED BY PURCHASE AND LEASE- Water acquired from voluntary sellers and lessors shall be administered as a block of water separate from the Total Water Supply Available, in accordance with applicable Federal and State law.

(e) YAKIMA PROJECT PURPOSE- (1) An additional purpose of the Yakima Project shall be for fish, wildlife, and recreation.

(2) The existing storage rights of the Yakima Project shall include storage for the purposes of fish, wildlife, and recreation.

(3) The purposes specified in paragraphs (1) and (2) shall not impair the operation of the Yakima Project to provide water for irrigation purposes nor impact existing contracts.

SEC. 1206. LAKE CLE ELUM AUTHORIZATION OF APPROPRIATIONS.

(a) MODIFICATIONS AND IMPROVEMENTS- There is hereby authorized to be appropriated to the Secretary--

(1) at September 1990 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuation of applicable indexes, $2,934,000 to--

(A) modify the radial gates at Cle Elum Dam to provide an additional 14,600 acre-feet of storage capacity in Lake Cle Elum,

(B) provide for shoreline protection of Lake Cle Elum, and

(C) construct juvenile fish passage facilities at Cle Elum Dam, plus

(2) such additional amounts as may be necessary which may be required for environmental mitigation.

(b) OPERATION AND MAINTENANCE APPROPRIATIONS- There is hereby authorized to be appropriated to the Secretary such sums as may be necessary for that portion of the operation and maintenance of Cle Elum Dam determined by the Secretary to be a Federal responsibility.

SEC. 1207. ENHANCEMENT OF WATER SUPPLIES FOR YAKIMA BASIN TRIBUTARIES.

(a) GENERAL PROVISIONS- The following shall be applicable to the investigation and implementation of measures to enhance water supplies for fish and wildlife and irrigation purposes on tributaries of the Yakima River basin:

(1) An enhancement program authorized by this section undertaken in any tributary shall be contingent upon the agreement of appropriate water right owners to participate.

(2) The enhancement program authorized by this section shall not be construed to affect (A) the water rights of any water right owners in the tributary or other water delivering entities; (B) the capability of tributary water users to divert, convey, and apply water; and (C) existing water and land uses within the tributary area.

(3) The water supply for tributary enhancement shall be administered in accordance with applicable State and Federal laws.

(4) Any enhancement program authorized by this section shall be predicated upon the availability of a dependable water supply.

(b) STUDY- (1) The Secretary, following consultation with the State of Washington, the tributary water right owners, and the Yakama Indian Nation, and agreement of appropriate water right owners to participate, shall conduct a study concerning the measures that can be implemented to enhance water supplies for fish and wildlife and irrigation purposes on Taneum Creek, including (but not limited to)--

(A) water use efficiency improvements;

(B) the conveyance of water from the Yakima Project through the facilities of any irrigation entity willing to contract with the Secretary without adverse impact to water users;

(C) the construction, operation, and maintenance of ground water withdrawal facilities;

(D) contracting with any entity that is willing to voluntarily limit or forego present water use through lease or sale of water or water rights on a temporary or permanent basis;

(E) purchase of water rights from willing sellers; and

(F) other measures compatible with the purposes of this title, including restoration of stream habitats.

(2) In conducting the Taneum Creek study, the Secretary shall consider--

(A) the hydrologic and environmental characteristics;

(B) the engineering and economic factors relating to each measure; and

(C) the potential impacts upon the operations of present water users in the tributary and measures to alleviate such impacts.

(3) The Secretary shall make available to the public for a 45-day comment period a draft report describing in detail the findings, conclusions, and recommendations of the study. The Secretary shall consider and include any comment made in developing a final report. The Secretary's final report shall be submitted to the Committee on Energy and Natural Resources of the Senate, the Committee on Natural Resources of the House of Representatives, and the Governor of the State of Washington, and made available to the public.

(c) IMPLEMENTATION OF NONSTORAGE MEASURES- After securing the necessary permits the Secretary may, in cooperation with the Department of Ecology of the State of Washington and in accordance with the laws of the State of Washington, implement nonstorage measures identified in the final report under subsection (b) upon fulfillment of the following conditions:

(1) The Secretary shall enter into an agreement with the appropriate water right owners who are willing to participate, the State of Washington, and the Yakama Indian Nation, for the use and management of the water supply to be provided by proposed tributary measures pursuant to this section.

(2) The Secretary and the State of Washington find that the implementation of the proposed tributary measures will not impair the water rights of any person or entity in the affected tributary.

(d) OTHER YAKIMA RIVER BASIN TRIBUTARIES- Enhancement programs similar to the enhancement program authorized by this section may be investigated and implemented by the Secretary in other tributaries contingent upon the agreement of the appropriate tributary water right owners to participate. The provisions set forth in this section shall be applicable to such programs.

(e) AUTHORIZATION OF APPROPRIATIONS- (1) There is hereby authorized to be appropriated to the Secretary $500,000 for the study of the Taneum Creek Project and such amount as the Secretary subsequently determines is necessary for implementation of tributary measures pursuant to this section.

(2) There is also authorized to be appropriated to the Secretary such funds as are necessary for the investigation of enhancement programs similar to the enhancement program authorized by this section in other Yakima River basin tributaries contingent upon the agreement of the appropriate water right owners to participate. Funds for the implementation of any such similar enhancement program may not be appropriated until after the Secretary submits an investigation report to the appropriate congressional committees.

SEC. 1208. CHANDLER PUMPING PLANT AND POWERPLANT-OPERATIONS AT PROSSER DIVERSION DAM.

(a) AUTHORIZATION OF APPROPRIATIONS FOR ELECTRIFICATION- In order to provide for electrification to enhance instream flows by eliminating the need to divert water to operate the hydraulic turbines which pump water to the Kennewick Irrigation District, there is authorized to be appropriated--

(1) $50,000 to conduct an assessment of opportunities for alternative pumping plant locations;

(2) $4,000,000 for construction; and

(3) such sums as may be necessary for the prorata share of the operation and maintenance allocated to fish and wildlife as determined by the Secretary.

(b) POWER FOR PROJECT PUMPING- (1) The Administrator of the Bonneville Power Administration shall provide for project power needed to effect the electrification as provided in subsection (a).

(2)(A) There is authorized to be appropriated for the Bureau of Reclamation for each fiscal year in which the Administrator provides power under this subsection an amount equal to the cost to the Bonneville Power Administration of providing power under this subsection during such fiscal year. The rate to be utilized by the Administrator in determining the cost of power under this paragraph in a fiscal year shall be the rate for priority firm power charged by the Bonneville Power Administration in that fiscal year under section 7(b) of the Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. 839e(b)).

(B) The Bureau of Reclamation shall, using funds appropriated pursuant to the authorization of appropriations in subparagraph (A), reimburse the Bonneville Power Administration for the costs of the project power provided under this subsection. Such funds shall be available for such purpose without fiscal year limitation.

(c) SUBORDINATION- Any diversions for hydropower generation at the Chandler Powerplant shall be subordinated to meet the flow targets determined under subsection (f).

(d) WATER SUPPLY FOR KENNEWICK IRRIGATION DISTRICT- The Secretary shall ensure that the irrigation water supply for the Kennewick Irrigation District shall not be affected by conservation, electrification, or subordination pursuant to this title and any reduction in its irrigation water supply resulting from conservation measures adopted or implemented by other entities pursuant to this title shall be replaced by water developed through subordination, electrification, or a combination of the two.

(e) TREATMENT OF CERTAIN FUNDS- Funds appropriated and project power provided pursuant to this section shall be nonreimbursable since such funds are used for fish and wildlife purposes and such funds are not subject to cost share under section 1203(d).

(f) TARGET FLOWS- Target flows measured at appropriate biological and hydrological location or locations shall be determined by the Yakima Project Superintendent in consultation with the System Operations Advisory Committee.

SEC. 1209. AUGMENTATION OF KACHESS RESERVOIR STORED WATER.

(a) AUTHORIZATION OF APPROPRIATIONS- In order to augment Kachess Reservoir stored water supplies from flows of Cabin Creek and Silver Creek which are excess to system demands, there is authorized to be appropriated--

(1) such sums as may be necessary to carry out a feasibility study, including the benefits, costs, and environmental aspects, of the facility described in paragraph (2);

(2) for the construction of facilities to convey such flows to Kachess Reservoir, $20,000,000; and

(3) such sums as may be necessary for the pro rata share of the operation and maintenance allocated to fish and wildlife determined by the Secretary.

(b) LIMITATION- Construction of the facilities described in subsection (a)(1) is contingent on the completion of the feasibility study referred to in subsection (a)(2).

(c) USE OF ADDITIONAL WATER- The stored water supply resulting from the construction of facilities under this section shall be used by the Secretary to--

(1) enhance the water supply available to the Kittitas Reclamation District and the Roza Irrigation District in years of proration; and

(2) facilitate reservoir operations in the Easton Dam to Keechelus Dam reach of the Yakima River for the propagation of anadromous fish.

(d) TREATMENT OF COSTS- The construction and operation and maintenance costs of the facilities under this section shall be allocated to irrigation and fishery enhancement, as follows:

(1) The portion of such costs allocated to irrigation is reimbursable, with the construction costs to be paid prior to initiation of construction by the Kittitas Reclamation District and the Roza Irrigation District.

(2) The portion of such costs allocated to fishery enhancement is nonreimbursable.

(e) KACHESS DAM MODIFICATIONS- There is authorized to be appropriated $2,000,000 for the modification of the discharge facilities of Kachess Dam to improve reservoir operations for anadromous fish enhancement. Amounts appropriated under this subsection are nonreimbursable.

SEC. 1210. INTERIM COMPREHENSIVE BASIN OPERATING PLAN.

(a) DEVELOPMENT- The Secretary shall, in consultation with the State of Washington, Yakama Indian Nation, Yakima River Basin irrigation districts, Bonneville Power Administration, and other entities as determined by the Secretary, develop an interim comprehensive operating plan for providing a general framework within which the Yakima Project Superintendent operates the Yakima Project, including measures implemented under the Yakima River Basin Water Enhancement Project, including (but not limited to)--

(1) operating capability and constraints of the system;

(2) information on water supply calculations and water needs;

(3) system operations and stream flow objectives; and

(4) the System Operations Advisory Committee activities.

(b) PROCESS REQUIREMENTS- A draft of the interim comprehensive basin operating plan shall be completed within 18 months after the completion of the Basin Conservation Plan under section 1203(f) and, upon completion, published for a 90-day public review period. The Secretary shall complete and publish the final interim comprehensive operating plan within 90 days after the close of the public review period. The Secretary shall update the plan as needed to respond to decisions from water adjudications relating to the Yakima River basin.

(c) AUTHORIZATION OF APPROPRIATIONS- There is authorized to be appropriated $100,000 to carry out this section.

SEC. 1211. ENVIRONMENTAL COMPLIANCE.

There are hereby authorized to be appropriated to the Secretary $2,000,000 for environmental compliance activities including the conduct, in cooperation with the State of Washington, of an inventory of wildlife and wetland resources in the Yakima River basin and an investigation of measures, including `wetland banking', which could be implemented to address potential impacts which could result from the activities taken under this title.

SEC. 1212. SAVINGS AND CONTINGENCIES.

(a) IN GENERAL- Nothing in this title shall be construed to--

(1) affect or modify any treaty or other right of the Yakama Indian Nation;

(2) authorize the appropriation or use of water by any Federal, State, or local agency, the Yakama Indian Nation, or any other entity or individual;

(3) impair the rights or jurisdictions of the United States, the States, the Yakama Indian Nation, or other entities over waters of any river or stream or over any ground water resource;

(4) alter, amend, repeal, interpret, modify, or be in conflict with any interstate compact made by the States;

(5) alter, establish, or impair the respective rights of States, the United States, the Yakama Indian Nation, or any other entity or individual with respect to any water or water-related right;

(6) alter, diminish, or abridge the rights and obligations of any Federal, State, or local agency, the Yakama Indian Nation, or other entity, public or private;

(7) affect or modify the rights of the Yakama Indian Nation or its successors in interest to, and management and regulation of, those water resources arising or used, within the external boundaries of the Yakama Indian Reservation;

(8) affect or modify the settlement agreement between the United States and the State of Washington filed in Yakima County Superior Court with regard to Federal reserved water rights other than those rights reserved by the United States for the benefit of the Yakama Indian Nation and its members;

(9) affect or modify the rights of any Federal, State, or local agency, the Yakama Indian Nation, or any other entity, public or private with respect to any unresolved and unsettled claims in any water right adjudications, or court decisions, including State against Acquavella, or constitute evidence in any such proceeding in which any water or water related right is adjudicated; or

(10) preclude other planning studies and projects to accomplish the purposes of this title by other means: funded publicly, privately, or by a combination of public and private funding.

(b) CONTINGENCY BASED ON APPROPRIATIONS- The performance of any activity under this title which requires accomplishment within a specified period that may require appropriation of money by Congress or the allotment of funds shall be contingent upon such appropriation or allotment being made.

Appendix B

NOTICE OF ADOPTION

NOTICE OF ADOPTION OF EXISTING ENVIRONMENTAL DOCUMENT

Description of current proposal: Cle Elum Pool Raise Environmental Impact Statement (EIS)

Proponent: Washington State Department of Ecology

Location of current proposal: Kittitas County, State of Washington

Title of documents being adopted:

Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project Final EIS (Reclamation and Ecology, 2011b)

Yakima River Basin Integrated Water Resource Management Plan Final Programmatic Environmental Impact Statement (Reclamation and Ecology, 2012)

Date adopted documents were prepared: April 2011; March 2012

Description of documents being adopted:

The Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project EIS is a joint NEPA/SEPA document prepared by Reclamation and Ecology. It evaluates potential impacts of constructing fish passage facilities at the dam and reintroducing fish above the dam. The EIS is adopted to help document the existing conditions at Cle Elum Reservoir.

The Yakima River Basin Integrated Water Resource Management Plan Programmatic EIS is a joint NEPA/SEPA document prepared by Reclamation and Ecology. The EIS evaluates the potential impacts of implementing the Integrated Plan, a comprehensive approach to water resources and ecosystem restoration improvements in the Yakima River basin. The Integrated Plan includes seven elements: reservoir fish passage, structural and operational changes to existing facilities, surface water storage, groundwater storage, habitat/watershed protection and enhancement, enhanced water conservation, and market reallocation. It is adopted to help document the potential impacts of the Cle Elum Pool Raise Project, which is included as projects in the Integrated Plan and was evaluated at a programmatic level in the Integrated Plan EIS.

If the document being adopted has been challenged (WAC 197-11-630), please describe:

N/A

The documents are available to be read at (place/time): The adopted documents were distributed to agencies with jurisdiction, Tribes, and other interested parties when they were released. The documents may be viewed at Washington State Department of Ecology offices during normal business hours (8:00 a.m. to 5 p.m., Monday to Friday) at the following locations:

Department of Ecology Headquarters
300 Desmond Drive
Lacey, WA 98503

Department of Ecology Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902-3452

The adopted documents can be viewed on-line at the following locations.

Yakima River Basin Integrated Water Resource Management Plan Final Programmatic EIS:

http://www.usbr.gov/pn/programs/yrbwep/reports/FPEIS/fpeis.pdf

Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project Final EIS:

http://www.usbr.gov/pn/programs/eis/cle-elum/index.html

EIS REQUIRED: The lead agency has determined the Cle Elum Pool Raise Project is likely to have significant adverse impact on the environment. To meet the requirements of RCW 43.21C.030(2)(c), the lead agency is adopting portions of the NEPA and SEPA documents described above, in addition to preparing a stand-alone NEPA/SEPA EIS for the proposal, to fulfill its requirements under SEPA.

The lead agency has determined that this document is appropriate for the proposal and will accompany the proposal to decision makers.

Name of agency adoption document: Washington State Department of Ecology

Responsible Official: Derek I. Sandison

Position/title: Director, Office of Columbia River

Address: 303 S. Mission Street, Suite 200
Wenatchee, WA 98801

Phone: 509-662-0516

Date: September 16, 2014 **Signature:** ______________________

Appendix C

CORRESPONDENCE WITH THE SYSTEM OPERATIONS ADVISORY COMMITTEE

United States Department of the Interior
BUREAU OF RECLAMATION
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, Washington 98901-2058

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

CCA-1610
PRJ-3.00

JUN 19 2014

Mr. Jeff Thomas
Member
System Operations Advisory Committee
1917 Marsh Road
Yakima, WA 98901

Subject: System Operations Advisory Committee Communication on the Cle Elum Pool Raise Environmental Impact Statement – RiverWare Modeling Operational Scenarios

Dear Mr. Thomas:

This letter is part of our ongoing coordination with the System Operations Advisory Committee (SOAC) regarding Bureau of Reclamation's compliance with the direction outlined in Title XII of the Yakima River Basin Water Enhancement Project (YRBWEP) legislation (Public Law 103-434, Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994, Title XII, Yakima River Basin Water Enhancement Project, [108 Stat. 4526 U.S. Code]). Reclamation and Washington State Department of Ecology are preparing an Environmental Impact Statement (EIS) for the Cle Elum Pool Raise (CEPR) Project. The CEPR Project is authorized in Sections 1205 and 1206 of Title XII.

Section 1205 states:

> "(b) WATER FROM LAKE CLE ELUM- Water accruing from the development of additional storage capacity at Lake Cle Elum, made available pursuant to the modifications authorized in section 1206(a), shall not be part of the Yakima River basin's water supply as provided in subsection (a)(1). Water obtained from such development is exclusively dedicated to instream flows for use by the Yakima Project Superintendent as flushing flows or as otherwise advised by the System Operations Advisory Committee. Water may be carried over from year-to-year in the additional capacity to the extent that there is space available. Releases may be made from other Yakima Project storage facilities to most effectively utilize this additional water, except that water deliveries to holders of existing water rights shall not be impaired."

Section 1206 states:

"(a) MODIFICATIONS AND IMPROVEMENTS- There is hereby authorized to be appropriated to the Secretary--
(1) at September 1990 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuation of applicable indexes, $2,934,000 to--
(A) modify the radial gates at Cle Elum Dam to provide an additional 14,600 acre-feet of storage capacity in Lake Cle Elum,
(B) provide for shoreline protection of Lake Cle Elum, and
(C) construct juvenile fish passage facilities at Cle Elum Dam, plus
(2) such additional amounts as may be necessary which may be required for environmental mitigation.
(b) OPERATION AND MAINTENANCE APPROPRIATIONS- There is hereby authorized to be appropriated to the Secretary such sums as may be necessary for that portion of the operation and maintenance of Cle Elum Dam determined by the Secretary to be a Federal responsibility."

For the purposes of the EIS, Reclamation and Ecology are evaluating a range of operational alternatives described below. The additional storage would occur during spring and early summer in those years when high flows from snowmelt fill the reservoir. Flows from the reservoir would be slightly reduced while the reservoir is filling as compared to the baseline condition during the spring. The additional stored water could be used during summer, fall, or winter. Use of the increased storage may change annually and over time due to improved knowledge of instream flow needs and specific flow needs identified in any one year. For that reason, the additional stored water would be managed adaptively by Reclamation for instream flows with advice from SOAC. Potential uses of the additional flows are described below:

1. **Use of Additional Water for Carryover Storage.** For this scenario, the additional storage would not be released in the year the reservoir elevation exceeds 2,240 feet. The additional storage would be conserved or carried over.

2. **Use of Additional Stored Water for Instream Flows.** For this scenario, the additional stored water would be released during winter (October to March) to increase instream flow in the Cle Elum River and increase overwintering habitat. The additional stored water would provide instream flows of approximately 40 cfs for 6 months. Reclamation acknowledges that releases equal to the increased volume stored at Cle Elum may also be made at other times of the year at varying rates and also may be made from other Yakima Project reservoirs in lieu of releases from Cle Elum, as stated in Section 1205. However, Reclamation does not anticipate this will be outside existing operational ranges.

3. **Use of Additional Stored Water for Total Water Supply Available (TWSA).** For this reservoir operation alternative, the additional stored water would be managed as part of TWSA. TWSA provides an estimated total water volume available for use in determining the instream flow targets for each year in accordance with the operating criteria of the YRBWEP legislation. As part of TWSA, the additional water supply could be used to provide water supply for proratable irrigation districts in a drought or other

out-of-stream water users in a drought and for instream flows, as described in the YRBWEP legislation. Although a TWSA operational scenario would require additional authorization, it is evaluated in the EIS to provide for the full range of environmental impacts from operation of the CEPR Project.

Reclamation requests written concurrence that you agree that the range of scenarios described above provides for the likely scenarios upon which SOAC would advise Reclamation once the CEPR Project is fully operational.

Reclamation and Ecology appreciate your attention to this matter and look forward to working with you on this project.

Sincerely,

Sidney P. Ottem
Yakima Field Office Manager

Identical Letters Sent To:

Mr. David Child, Member
System Operations Advisory Committee
2807 W. Washington Avenue
Yakima, WA 98902

Mr. John Easterbrooks, Member
System Operations Advisory Committee
1701 South 24th Avenue
Yakima, WA 98902

Mr. Mark Johnston, Member
System Operations Advisory Committee
760 Pence Road
Yakima, WA 98902

cc: Mr. Derek Sandison
Washington State Department of Ecology
Office of Columbia River
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902

Mr. Sidney Ottem
Yakima Field Office Manager
Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, WA 98901-2058

Subject: System Operations Advisory Committee Communication on the Cle Elum Pool Raise Environmental Impact Statement – RiverWare Modeling Operational Scenarios

Dear Mr. Ottem:

In response to your letter dated June 19, 2014 regarding the Operational Scenarios for Cle Elum Pool Raise Project (CEPR), the System Operations Advisory Committee (SOAC) understands that an Environmental Impact Statement (EIS) for the proposed CEPR is being prepared by Reclamation and Ecology. We further understand that a range of operational scenarios must be presented in the EIS to adequately describe the range of possible environmental impacts. We understand that the RiverWare model will be used to analyze three operational scenarios:

1. **Use of Additional Water for Carryover Storage.**
2. **Use of Additional Stored Water for Instream Flows.**
3. **Use of Additional Stored Water for Total Water Supply Available (TWSA).**

The SOAC hereby concurs that the range of scenarios listed above provides for the likely scenarios upon which SOAC would advise Reclamation once the CEPR Project is fully operational.

7-15-14   7-23-14

Jeff Thomas — Date
U.S. Fish and Wildlife Service

Mark Johnston — Date
Yakama Nation

John a. Easterbrooks

7/15/14   7/15/14

John Easterbrooks — Date
Washington Department of Fish and Wildlife

David Child — Date
Yakima Basin Joint Board

cc: Mr. Derek Sandison
Washington State Department of Ecology
Office of Columbia River
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902

Appendix D

SPECIES LISTS

Table D-1. Survey and Manage Species in the Cle Elum Ranger District (USFS, 2001 and 2009; BLM, 2011; Lau, 2012)

Species Name	Survey and Manage Category[1]	Habitat[2]
Vascular Plants		
Mingan moonwort	A	Riparian zones and old-growth western red cedar in dense shade, sparse understory, alluvium substrate, and often a duff layer of cedar branchlets.
Mountain grape-fern	A	Dark coniferous forests, usually near western red cedar swamps and streams from 3300-9800 feet in elevation.
Cold-water corydalis	A	In western hemlock and pacific silver fir zone and near cold flowing water and seeps and small streams.
Hemlock dwarf mistletoe	F	Principal host trees are mountain hemlock and true firs. Secondary host trees include pines and spruces.
Clustered lady's slipper	C	Habitat varies from dry to damp, rocky to loamy. Found in areas with 60 to 100 percent shade provided by various plant communities including mixed evergreen, mixed conifer, Douglas fir, and pine forest.
Mountain lady's slipper	C	Grows on a wide variety of substrates in wooded communities with 60-80 percent canopy closure in mixed conifer forests commonly consisting of Douglas fir with pine or grand fir.
Lichens[3]		
Cladonia norvegica	C	Decaying bark or wood at the base of conifer trees and on decaying logs in humid Douglas fir, Sitka spruce, and Western hemlock forests
Hypogymnia duplicata	C	Epiphyte on mountain hemlock, western hemlock, Pacific silver fir, Douglas fir and subalpine fir in old-growth forests between 1100-5450 feet
Lobaria linita	A	Moss-covered rocks in cool, moist areas in forests bordering Pacific silver fir and mountain hemlock zones. May also grow on trunks of fir trees.
Usnea longissima	F	Old-growth and late-successional conifer stands, hardwood stands, and riparian areas
Fungi[3]		
Acanthophysium farlowii	B	Recently dead twigs of live true firs, Douglas fir, and hemlock.
Albatrellus ellisii	B	Found on ground in forests
Bondarzewia mesenterica (B. montana)	B	Late successional conifer forests in Washington, often associated with stumps or snags
Cantharellus subalbidus	D	Conifer forests
Chalciporus piperatus	D	Scattered in humus in mixed woods

Clavariadelphus occidentalis	B	On soil or duff under mixed deciduous-coniferous forests
Clavariadelphus sachalinensis	B	
Clavariadelphus truncatus (borealis)	B	
Craterellus tubaeformis	D	On wet soil, often along streams or near springs or in bogs under conifers; also juxtaposed to rotten logs.
Cudonia monticola	B	On spruce needles and coniferous debris.
Gastroboletus turbinatus	B	Montane and subalpine forests of true firs, spruce, and pine
Gomphus clavatus	F	Partially hidden in deep humus in coniferous forests.
Gomphus kauffmanii	E	
Gyromitra californica	B	Well-rotted stumps or logs of coniferous trees
Helvella crassitunicata	B	Found on soil, especially along trails, in montane regions with true pines
Hypomyces luteovirens	B	Obligate parasite of species in the *Russulaceae*; found in association with roots of various tree species in the pine family.
Mycena overholtsii	D	Decayed wood in true fir forests
Otidea leporina	D	Spruce, Douglas fir, and western hemlock forests.
Polyzellus multiplex	B	Occurs in association with roots of true firs in late successional, mid-elevation, montane, conifer forests.
Ramaria araiospora	B	Spruce, Douglas fir, and western hemlock forests.
Rhizopogon evadens var. subalpinus	B	Roots of mountain hemlock or true firs.
Sarcodon fuscoindicus	B	Found in soil throughout forests
Sparassis crispa	D	Within 6 feet of the base of a living Douglas fir or pine tree
Spathularia flavida	B	Litter or woody debris of conifer and hardwood forests
Tremiscus helvelloides	D	Duff, soil, and rotten wood under conifers.

[1] Categories A through F are ranked highest to lowest based on level of relative rarity, ability to reasonably and consistently locate occupied sites during surveys prior to habitat disturbing activities, and the level of information known about the species or group of species (USFS, 2001).

[2] Potash, 1998a and 1998b; Lau, 2012; Hawksworth et al., 1996; Seevers and Lang, 1998a and 1998b; BLM, 2014a, 2014b, and 2014c; Glavich, 2013; Castellano et al., 1999 and 2003.

[3] Lichens and Fungi are listed by scientific name only.

Table D-2. USFS Sensitive and Strategic Species in the Cle Elum Ranger District (WDNR, 2014a; Lau, 2012; USFS, 2011b)

Common Name	Habitat[1]	Documented in Cle Elum Ranger District[1]	Potential Habitat in the Study Area[1]	WNHP State Status[2]
Vascular Plants				
Tall agoseris	Meadows and open woods, from lowlands to timberline in the mountains	x		S
Northern bentgrass	Banks and gravel bars in river and lake valleys, and on open grasslands and rocky slopes of mountains and cliff		x	T
Sierra onion	Rocky, thin or sandy soils of open slopes, dry meadows and dry drainage channels		x	T
Least bladdery milk-vetch	Gravelly, sandy areas, often in open woods. Prairies and foothills to Ponderosa pine forests at moderate elevations		x	S
Triangular-lobed moonwort	Perennial streams in coniferous forests. Grows in surface gravel, moist decayed litter, and rocky soil.		x	S
Blackened sedge	Mid to high elevation forest and subalpine meadows		x	---
Hair-like sedge	Streambanks, wet meadows, wet ledges and marshy lake shores.		x	T
Cordroot sedge	Wetlands, peatlands, sphagnum bogs and lakeshores		x	S
Bristly sedge	Marshes, lake margins, drainage ditches, rivulets, and wet meadows in lowlands		x	S
Yellow bog sedge	Sphagnum bogs, forested wetlands and other wet marshy places		x	---
Large-awned sedge	Moist or wet, open places and near the coast. Seepages near *Alnus sinuata* thickets on basalt cliffs.		x	T
Beaked sedge	Quaking or floating peat in association with slender sedge along lake shoreline	x	x	S

Canadian single-spike sedge	Moist meadows, rocky outcrops with some soil development at high elevations, 5900-7400 feet	x		S
Dryspike sedge	Open, sandy oak, oak-pine, or pine forests and savannas, dry prairies, sand dunes, sandy fields, sunny rock outcrops, alpine or subalpine meadows; 0–3600 meters	x		
Long-styled sedge	Coastal regions in shallow marshes, gravelly loam, streambanks and moist meadows. Some over hardened lava flow.		x	S
Many-headed sedge	Moist or wet low ground, especially in marshes or along beaches and shores.		x	S
Sparse-flowered sedge	Bogs, fens, swamps, wet grassy areas, occasionally in seepage areas in forest.		x	T
Thompson's chaenactis	Habitat: Open, usually rocky areas, at moderate to mid-elevations in the mountains.	x		S
Lanceleaf springbeauty	Wet subalpine to alpine meadows, often flowering near the edge of melting snow		x	---
Fernleaf goldthread	Moist, cool, old forest with a well-developed litter layer		x	---
Cold-water corydalis	Near cold flowing water and seeps and small streams in western hemlock/pacific silver fir zone		x	S
Wenatchee larkspur	Boggy meadowlands.	x		E
Yellow mountain-avens	In crevices of rocky, dry cliffs, High mountains, often above timberline, but down to lower elevations along streams		x	S
Purple spike-rush	Wet places, lake shores		x	---
Water avens	Stream banks, lake shores, bogs and wet meadows		x	S
Oregon goldenaster	On sand and gravel bars along rivers and streams		x	T
Longsepal globemallow	Dry, open hillsides, gravelly stream sides, and open Ponderosa pine forests, low to mid elevations.	x		S
Western jewel-weed	Disturbed, moist often shaded		x	T
Water lobelia	Occurs in shallow water at		x	T

	margins of lakes and ponds.			
Suksdorf's monkeyflower	Wet to dry open places; lowlands to rather high in the mountains.		x	---
Branching montia	Moist woods at low elevation.	x	x	S
Coyote tobacco	Dry sandy bottom lands, and in other dry open places		x	S
Yellowflower locoweed	Forest openings, moderate to mid elevations in the mountains		x	---
Brewer's cliffbrake	Open, rocky alpine areas from 4700 to 6700 feet	x		S
Fuzzytongue penstemon	West facing slopes of small canyons and in dry and rocky habitats in the foothills of the Cascade Range	x		S
Chelan rockmat	Crevices on ledges of open cliffs and rock outcrops	x		---
Least phacelia	Seasonally wet openings on clay pan	x		E
American pillwort	In shallow water of ponds an temporary pools and on reservoir margins		x	T
Pine-foot	Second growth forest at low elevations		x	T
Choris' bog-orchid	In shallow water of ponds and temporary pools and on reservoirs margins		x	T
Small northern bog-orchid	Damp to wet forested areas		x	S
Brewer's cinquefoil	Moist meadows, lake margins, and stream banks to dry, open exposed slopes at 5,000-6,000 feet	x		T
Cutleaf anemone	Prairies, wet meadows and on alpine slopes and ridges in loose, sandy, well drained soil at 5000-6000 feet.	x	x	---
Sticky goldenweed	Meadows and open or sparsely wooded slopes in the foothills to moderate elevations in the mountains.	x	x	S
Idaho gooseberry	Along streams, and slopes of moist to dry canyons		x	T
Lowland toothcup	Lakeshores, wet; in muddy soil		x	t
Black snake-root	Moist, low ground, less often on moist, wooded slopes.		x	S
Seely's silene	Cliffs and talus slopes at moderate to mid-elevations in	x		S

	the mountains.			
Western ladies' tresses	Moist to wet meadows	x		S
Thompson's clover	Common on dry, grassy hillsides just below the ponderosa pine woodlands		x	t
Flat-leaved bladderwort	Shallow, standing or slowly moving water.	x		---
Velvet-leaved blueberry	Moist or dry soil and bogs		x	S
Bryophytes				
Schistostega pennata		x	x	---

[1] Lau, 2012

[2] WDNR, 2014

Table D-3. Invasive Plant Species in Kittitas County and the Cle Elum Ranger District (Lau, 2012)

Common Name	Cle Elum Ranger District Priority Weeds	Kittitas County Regulated Noxious Weed
Absinth wormwood	x	x
Musk thistle	x	x
Diffuse knapweed	x	x
Brown knapweed	x	x
Spotted knapweed	x	x
Meadow knapweed	x	x
Russian thistle	x	x
Chicory	x	x
Canada thistle	x	x
Bull thistle	x	x
Hounds tongue	x	x
Scotch broom	x	x
Foxglove		x
Herb robert		x
English Ivy		x
Orange hawkweed	x	x
Yellow hawkweed	x	x
Common Hawkweed	x	x
European hawkweed	x	x
Common velvet grass		
St. johnswort	x	x
Cat's ear	x	x
Yellow flag iris		x
Yellow archangel		x
Everlasting peavine		x
Oxeye daisy	x	x
Dalmatian toadflax		x
Butter and eggs		x
Reed canarygrass		
Narrowleaf plaintain		
Greater plaintain		
Bohemian knotweed		x
Sulfur cinquefoil	x	x

English laurel		
Creeping buttercup		
Himalayan blackberry	x	x
Evergreen blackberry	x	x
Red sorrel		
Curly dock		
Tansy ragwort	x	x
Woodland ragwort	x	
Common groundsel	x	
Bladder campion		x
Common tansy	x	x
Dandelion		
Salsify		
Red clover		
White clover		
False mayweed		
Common mullein		
Field veronica		
Common speedwell		

Appendix E

U.S. FOREST SERVICE AQUATIC CONSERVATION STRATEGY OBJECTIVES

U.S. Forest Service Aquatic Conservation Strategy Objectives

The nine Aquatic Conservation Strategy Objectives were established in the Northwest Forest Plan (USFS and BLM, 1994b). The nine objectives are:

A. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

B. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

C. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

D. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

E. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

F. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

G. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

H. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability

I. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species

Appendix F

FISH AND WILDLIFE COORDINATION ACT LETTER FROM U.S. FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Central Washington Fish and Wildlife Office
215 Melody Lane, Suite 103
Wenatchee, Washington 98801

In Reply Refer To:
2015-CPA-0007

Memorandum

To: Area Manager, U.S. Bureau of Reclamation
Yakima, Washington
Attention: Dawn Wiedmeier

From: State Supervisor, Washington Fish and Wildlife Office Jessica L Gonzales for
Lacey, Washington

Subject: Wildlife Coordination Act Report Not Required for Cle Elum Pool Raise Draft Environmental Impact Statement

On February 10th, 2012, the U.S. Fish and Wildlife Service (Service) and the Washington Department of Fish and Wildlife (WDFW) jointly submitted to the Bureau of Reclamation (Reclamation) the Coordination Act Report (CAR) for the Yakima River Integrated Water Resource Management Plan's (Integrated Plan) Environmental Impact Statement (EIS), pursuant to the Fish and Wildlife Coordination Act (16 USC §661-666c). The Integrated Plan describes Reclamation's comprehensive approach to managing water resources, in the Yakima River Basin.

The Cle Elum Pool Raise Project (Project) was authorized by Title XII of the Yakima River Basin Water Enhancement Project. The main objective of the Project is to provide instream flow and benefit fisheries resources. The Cle Elum Pool Raise Project, a component of the Integrated Plan, provides an additional 14,600 acre-feet of storage capacity in Lake Cle Elum, shoreline protection of Lake Cle Elum, and environmental mitigation for Project impacts. On September 23, 2014, the Draft EIS for the Cle Elum Pool Raise Project was released for public comment.

The Service has reviewed the proposed action described in the Draft Environmental Impact Statement and has determined the proposed action, as well as anticipated impacts associated with constructing and operating the project, is consistent with the project description in the Final Programmatic EIS for the Integrated Plan. Therefore, the Service has determined that the CAR completed for the Integrated Plan is sufficient to apply to the Final Cle Elum Pool Raise Project EIS and no additional CAR is needed for the project.

The Service's decision to forgo submitting an additional CAR for the Cle Elum Pool Raise Project is based on the assumption that Reclamation will fulfill the recommendations contained in the CAR that are applicable to the Project, promptly finalize Section 7 consultation of on-going Reclamation operation and maintenance activities, and complete Section 7 consultation on the proposed Project. In order to stay consistent with the CAR and comply with federal law, Reclamation will need to initiate Section 7 consultation with the Service to ensure effects on federally-listed species are fully addressed prior to signing the Record of Decision for the Cle Elum Pool Raise Project EIS.

As described in the CAR, fish and wildlife resources of concern and of major Federal interest include bull trout, bull trout critical habitat, northern spotted owl, northern spotted owl critical habitat, critical habitat for steelhead, and habitat for greater sage-grouse. These species and habitats, to varying degrees, are dependent on areas within the project area that may be affected from implementing the Integrated Plan. The Cle Elum reservoir has been designated by the Service as critical habitat for bull trout. Also, improving habitat connectivity for all life stages of bull trout in the Yakima River Basin is a priority for the Service.

The Service looks forward to working with Reclamation and both the Integrated Plan bull trout technical and implementation teams to ensure Integrated Plan actions benefit bull trout and bull trout habitat critical. The Service values Reclamation's commitment to resource protection and commends Reclamation for their commitment to recover bull trout to healthy, sustainable populations simultaneously with Integrated Plan water supply and water delivery actions. For questions or concerns regarding this memo, please contact Jessica Gonzales, Assistant Project Leader by phone at 509-665-3508 extension 2000 and by email at Jessica_Gonzales@fws.gov.

cc:
WDFW, Yakima, WA (M. Livingston)
WDFW, Wenatchee, WA (C. Davidson)
USFWS, Yakima, WA (J. Thomas)

Appendix G

LETTERS FROM THE WASHINGTON DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION

August 14, 2014

Mr. Warren Hurley
Bureau of Reclamation
1917 Marsh Rd
Yakima, WA 98901-2058

In future correspondence please refer to:
Log: 081414-11-BOR
Property: Cle Elum Dam Pool Raise Project
Re: ADVERSE Effect

Dear Mr. Hurley:

Thank you for contacting the Department of Archaeology and Historic Preservation (DAHP). We have reviewed the materials you provided for this project. We concur with your determination that the project, as proposed, will have an Adverse Effect on a National Register of Historic Places property.

We look forward to further consultation and the development of a Memorandum of Agreement (MOA) to address this Adverse Effect.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4) and the survey report when it is available. These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800.

If you have any questions, please contact me.

Sincerely,

Russell Holter

Russell Holter
Project Compliance Reviewer
(360) 586-3533
russell.holter@dahp.wa.gov

DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
Protect the Past, Shape the Future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

February 9, 2015

Ms. Dawn A. Wiedmeier
Columbia-Cascades Area Office
Bureau of Reclamation
1917 Marsh Road
Yakima, Washington 098901-2058

Kachess Drought Relief Pumping Plant, K2K Conveyance, and
Cle Elum Dam Pool Raise Project
Log No.: 082014-06-BOR

Dear Ms. Wiedmeier:

Thank you for contacting our department. We have reviewed the professional archaeological survey report you provided for the proposed *Kachess Drought Relief Pumping Plant, K2K Conveyance, and Cle Elum Dam Pool Raise Project,* Kittitas County, Washington.

We concur with your Determination of Adverse Effect. We look forward to further consultations and the development of a Memorandum of Agreement to address the need for further identification, evaluation efforts and treatments of adverse effects. Please provide a draft MOA in an unlock Word format. We suggest a conference call is appropriate to discuss the path forward.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and this office notified.

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
email: *rob.whitlam@dahp.wa.gov*