Banks Lake Drawdown

Final Environmental Impact Statement

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Boise, Idaho

Upper Columbia Area Office
Ephrata Field Office
Ephrata, Washington

May 2004

MISSION STATEMENTS

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

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.

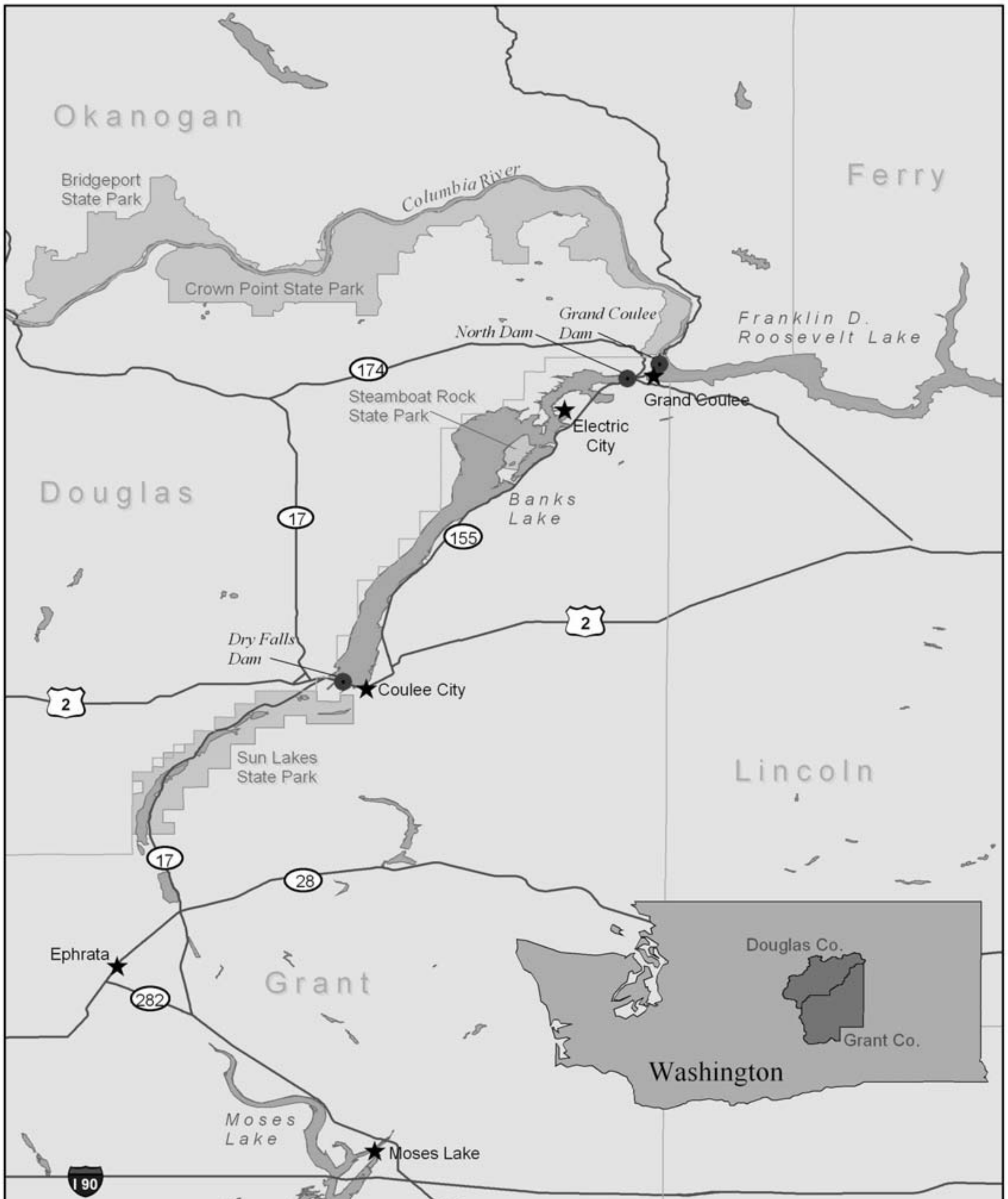
Final Environmental Impact Statement
Banks Lake Drawdown
Douglas and Grant Counties, Washington

Lead Agency:	U.S. Department of the Interior Bureau of Reclamation
For further information contact:	Jim Blanchard Special Projects Officer Ephrata Field Office Bureau of Reclamation Box 815 Ephrata, WA 98823 (509) 754-0226

The Action Alternative describes the resource conditions that would occur with Banks Lake water surface elevations between 1570 feet and 1560 feet, while the No Action Alternative describes the conditions that would occur without the action, with water surface elevation between 1570 feet and 1565 feet. Both the No Action and Action Alternatives include four potential operational scenarios that could occur annually within their respective ranges, depending upon the hydrology of any given year. Both alternatives include refilling the reservoir to elevation 1570 feet by September 22. The No Action Alternative is the preferred alternative.

The draft environmental impact statement provided Reclamation's determination that the Action Alternative "may affect but is not likely to adversely affect" the federally listed bald eagle (*Haliaeetus leucocephalus*) and would have no effect on the federally listed pygmy rabbit (*Brachylagus idahoensis*) or Ute ladies'-tresses (*Spiranthes diluvialis*). The U.S. Department of the Interior's Fish and Wildlife Service concurred with this assessment in a letter dated April 3, 2003, as part of the consultation process in compliance with section 7(a)(2) of the Endangered Species Act of 1973 as amended and codified in 50 CFR 402.

This analysis was done in compliance with Action 31 of the Reasonable and Prudent Alternative under the December 2000 Biological Opinion issued by the National Marine Fisheries Service (NMFS) (currently National Oceanic Atmospheric Administration [NOAA] Fisheries) for operation of the Federal Columbia River Power System. Therefore, additional ESA consultation with NOAA Fisheries is not necessary.



Banks Lake Drawdown
Environmental Impact Statement

Location Map

Summary

In December 2000, the National Marine Fisheries Service (NMFS—now the National Oceanic and Atmospheric Administration [NOAA] Fisheries) issued a Biological Opinion (BiOp) to the Bureau of Reclamation, Bonneville Power Administration, and the U.S. Army Corps of Engineers for the operation of the Federal Columbia River Power System (NMFS 2000). The BiOp included a Reasonable and Prudent Alternative (RPA), of which Action 31 advised the Bureau of Reclamation (Reclamation) to "assess the likely environmental effects of operation of Banks Lake up to 10 feet down from full pool during August."

Reclamation completed RPA Action 31 by preparing the Banks Lake Drawdown environmental impact statement (EIS), which describes and analyzes the environmental effects of lowering the August water surface elevation of Banks Lake annually to elevation 1560 feet, which is 10 feet below full pool of elevation 1570 feet.

Purpose and Need

The purpose of the action is to enhance the probability of meeting flow objectives in the Columbia River at McNary Dam by altering the August drawdown of Banks Lake from water surface elevation 1565 feet to water surface elevation 1560 feet annually. The action would enhance flows during the juvenile out-migration of Endangered Species Act (ESA) listed salmonid stocks (specifically Snake River fall chinook salmon) during August. This analysis complies with Action 31 of the Reasonable and Prudent Alternative of the Federal Columbia River Power System Biological Opinion, issued by the National Marine Fisheries Service (now National Oceanic and Atmospheric Administration [NOAA] Fisheries) on December 21, 2000.

The need is to provide increased flows in the Columbia River for ESA-listed salmonid stocks by modifying Banks Lake's operations.

Issues

The issues identified during the scoping process and considered throughout the discussion of the affected environment and environmental consequences in the EIS are:

- Lake elevations, instream flows, and water quality
- Irrigation deliveries
- Fish and wildlife
- Threatened and endangered species
- Recreation
- Public safety—roads, boating, and fire hazards
- Cultural resources
- Economics, particularly for local economy and power

General Description of the Area

Banks Lake, one of the principal reservoirs of the Columbia Basin Project (CBP), lies primarily within Grant County, but portions of the western shoreline extend into Douglas County. Banks Lake is a reregulating reservoir, which was created by damming the Grand Coulee with two dams—the North Dam and the Dry Falls Dam. The active capacity of Banks Lake is 715,000 acre feet; the reservoir's full pool elevation is 1570 feet.

The lands surrounding the lake support a rich vegetative mosaic of shrub-steppe, mesic shrub, upland forest, and riparian/wetland communities, many of which the Washington Department of Fish and Wildlife (WDFW) has identified as "priority habitats." The area supports a variety of wildlife. The riparian habitats along perennial streams and shorelines provide important winter roosting areas for many bird species, including the bald eagle. The islands at the southern end of the reservoir provide habitat for colonial nesting birds and waterfowl. Important waterfowl breeding areas include Devil's Punch Bowl, Osborn Bay, and the wetlands and waters located at the south end of Steamboat Rock peninsula and below Dry Falls Dam.

Alternatives

Two alternatives are described and analyzed in this EIS. The first alternative is the No Action Alternative, which describes the Banks Lake August water surface elevations that would occur if Reclamation decided not to implement the Action Alternative. Four scenarios are presented on how the water surface elevation 1565 feet by August 31 could be achieved. These scenarios vary, depending upon the hydrology of any particular year. The Action Alternative describes the proposed operational modification of August water surface elevations to achieve elevation 1560 feet by August 31.

There may be conditions when Reclamation would not provide the drawdowns described in the No Action and Action Alternatives. In addition, in some years drawdowns may be more than that described in the alternatives. Conditions that may trigger a lesser or greater drawdown could include, but are not limited to

(1) mechanical limitations to pumping capacity, (2) low water years when flows in September are predicted to be insufficient to supply refill water, (3) high water years when the contribution of Banks Lake is not needed to meet flow targets, (4) years when energy demand is predicted to limit the amount of power available for refill during early September, and (5) drawdowns for maintenance needs. Even during years with these types of conditions, partial drawdowns might be possible. Conditions that would preclude drawdowns are anticipated to occur infrequently.

For the analysis in this EIS, it is assumed that Banks Lake would be operated as described in the alternatives, with the scenario to be implemented based only on the hydrology of a given year. Impacts resulting from the infrequent changes to the described operation would be evaluated on a case specific basis with appropriate National Environmental Policy Act (NEPA) compliance being conducted at that time.

No Action Alternative—Preferred Alternative

Under No Action, Banks Lake water surface would normally range between water surface elevation 1570 feet and water surface elevation 1565 feet between August 1 and September 22. The goal and maximum possible draft of Banks Lake in August would be from water surface elevation 1570 feet to 1565 feet, based on RPA Action 23 of NMFS 2000 BiOp, which states that Reclamation shall operate Banks Lake at an elevation 5 feet from full pool during August. Approximately 133,600 acre-feet of water, the volume between elevation 1570 and 1565 feet, would be available to increase streamflow for fish migration targets during August. Under the No Action Alternative, Reclamation would still have the discretion to manage the lake level to other water surface elevations for authorized purposes. Three different scenarios to draft this volume of water in August were modeled, while another scenario assumed no draft during August. All four scenarios, as shown in figure S-1, are evaluated in the EIS.

Scenarios consist of Low Water, an Early Draft, a Uniform Draft, and a Late Draft. The Low Water scenario assumes that Banks Lake is at water surface elevation 1565 feet on August 1, while the remaining three scenarios assume that the water surface is at elevation 1570 feet on August 1.

Drawdown

The four different drawdown scenarios have been developed to show the range of conditions that may occur, depending upon the hydrology, as the lake is operated between water surface elevations 1570 and 1565 feet.

1. Low Water — Banks Lake water surface elevation at 1565 feet on August 1 and held at that elevation until August 31. Would begin drawdown no earlier than July 22. Average rate of draft during August = 0.0 feet per day.

2. Early Draft	Draft Banks Lake water surface elevation from 1570 feet on August 1 to elevation 1565 feet on August 10. Average rate of draft = 0.5 foot per day.
3. Uniform Draft	Draft Banks Lake water surface elevation from 1570 feet on August 1 to 1565 feet on August 31. Average rate of draft = 0.16 foot per day.
4. Late Draft	Draft Banks Lake water surface elevation from 1570 feet on August 22 to 1565 feet on August 31. Average rate of draft = 0.5 foot per day.

Refill

Under the No Action Alternative, the September 1 Banks Lake water surface elevation would be no lower than 1565 feet. Projected refill would occur over the period from September 1 until September 22 when the reservoir could reach elevation 1570 feet.

Action Alternative

In the Action Alternative, Banks Lake water surface elevations would normally range between elevation 1570 feet and 1560 feet between August 1 and September 22 annually (see figure S-2). Banks Lake water surface elevations could be as low as 1560 feet on August 11. Under the Action Alternative, Reclamation would still have discretion to manage the lake level to other elevations for authorized purposes.

Because normal September water surface elevations typically fluctuate from elevation 1565 feet to 1570 feet, a refill of the reservoir to elevation 1570 feet may be required. Therefore, the Action Alternative includes a refill that begins on September 1, reaching elevation 1565 feet by September 10 and 1570 feet by September 22.

Compared to No Action, the Action Alternative includes drafting an additional 5 feet annually from elevation 1565 feet to 1560 feet, providing an additional 127,200 acre-feet of water. This water could be used to increase the flow volume of the Columbia River at McNary Dam by about 1 to 2 percent during the month of August, compared to No Action.

Drawdown

The range of possible water surface elevations under the Action Alternative has been evaluated by selecting four scenarios, as shown by figure S-2. These scenarios consist of Low Water, an Early Draft, a Uniform Draft, and a Late Draft. The first

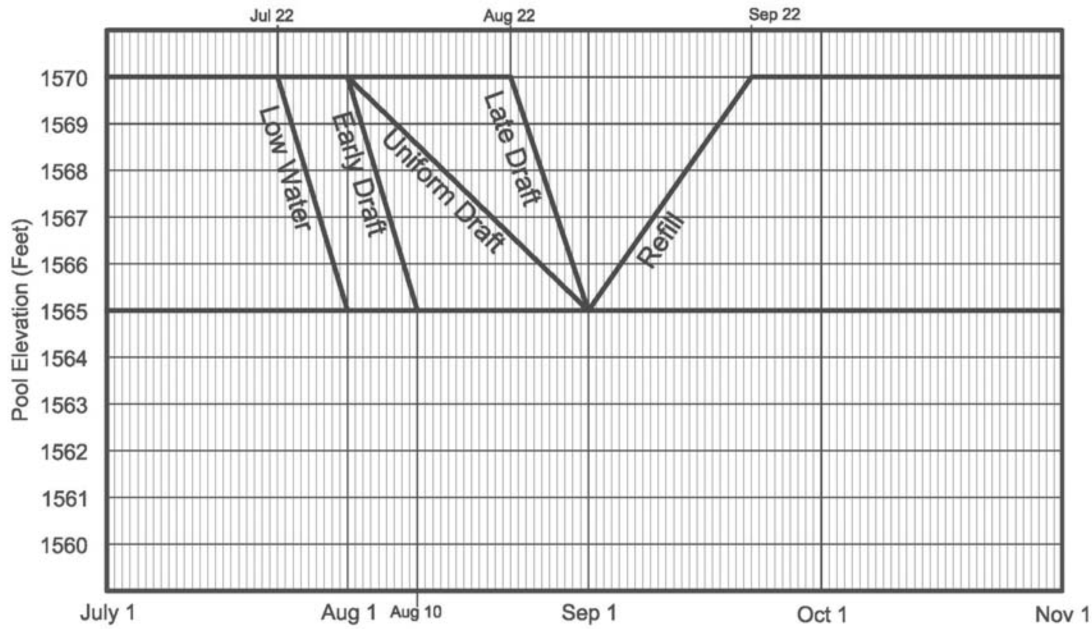


Figure S-1.—The four scenarios for the No Action Alternative.

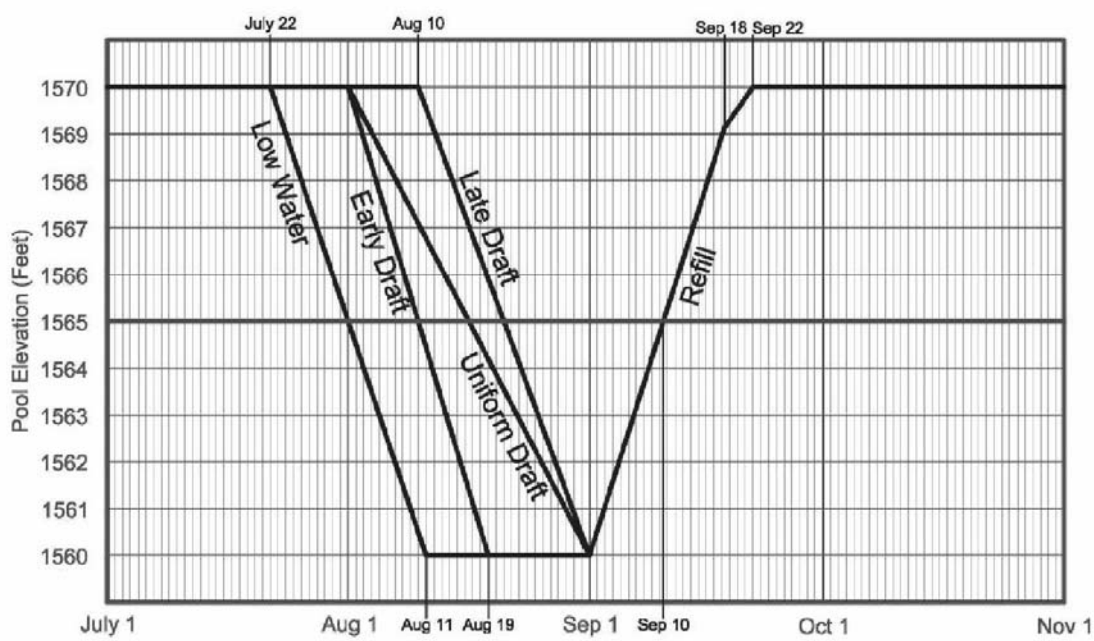


Figure S-2.—The four scenarios for the Action Alternative.

scenario assumes that the water surface is at elevation 1565 feet on August 1. The other scenarios assume that the Banks Lake water surface elevation is at 1570 feet on August 1.

1. Low Water	Draft Banks Lake from water surface elevation 1565 feet on August 1 to 1560 feet by August 10, where the water surface elevation will remain until August 31. Average rate of draft = 0.5 foot per day.
2. Early Draft	Draft Banks Lake water surface elevation from 1570 feet on August 1 to 1560 feet by August 20. Banks Lake water surface elevation remains at 1560 feet until August 31. Average rate of draft = 0.5 foot per day.
3. Uniform Draft	Draft Banks Lake water surface elevation from 1570 feet on August 1 to water surface elevation 1560 feet on August 31. Average rate of draft = 0.32 foot per day.
4. Late Draft	Beginning on August 11, draft Banks Lake water surface elevation from 1570 feet to water surface elevation 1560 feet by August 31. Average rate of draft = 0.5 foot per day.

Refill

Under the Action Alternative, August 31 Banks Lake water surface elevation target would be 1560 feet. Refill at the fastest rate possible would start on September 1 and would continue at that rate until approximately September 18 when the reservoir would be at about 1569 feet. (The rate would be based on pumping both light load hours and heavy load hours [LLH an HLH] while meeting irrigation demand—assumes that two units are unavailable because of annual maintenance outage). At that time (elevation 1569 feet), the Banks Lake water surface elevation would be identical under both the Action and No Action Alternatives and additional refill to elevation 1570 feet would be identical to refill under the No Action Alternative with the reservoir reaching elevation 1570 feet on September 22. As noted earlier, Reclamation would continue to have discretion to manage the lake level to fill at other times for other authorized uses.

Summary Comparison of Alternatives

A summary comparison of the environmental consequences of the alternatives is shown in table S-1.

Table S-1.—Summary comparison of the environmental consequences of the alternatives

Affected resource	No Action Alternative	Action Alternative
Vegetation, fish, and wildlife	Abundance and distribution continue to fluctuate with seasonal water levels, but overall stable.	Distribution and abundance impacted by more severe water level fluctuations.
Threatened and endangered species	Abundance and distribution continue to be limited by available habitat.	Fish prey may be more available to bald eagles. Although incrementally small, the 6 percent contribution adds to the total cumulative benefits of flow augmentation for salmon.
Recreation	7 of 12 boat launches are exposed and rendered unusable during the late recreation season (elevation 1565).	10 of 12 boat launches are exposed and rendered unusable at elevation 1562. Impacts to communities and businesses adjacent to the reservoir may be greater until users become accustomed to the greater fluctuation of the water surface. No launches on the southern half of Banks Lake would be usable. Steamboat Rock State Park (approx. 600,000 visitors annually) would not have a usable launch at elevation 1562.
Economics		
FCRPS[1]	FCRPS operates as it has historically.	As a result of the action, the difference in net energy generation results in a loss of 8,000 MWh annually.
GCPHA[2]	Power generation is not anticipated to change and will continue as it has historically.	Difference in net power generation losses range from 812 MWh to 1,695 MWh annually.
PUD[3] powerplants	Power generation is not anticipated to change and will continue as it has historically.	Difference in net power generation losses that would need to be replaced range from 6,248 MWh to 6,906 MWh annually.
Regional and local economy	Access to the water, number of recreation visits, recreation-related expenditures by the public, and the net benefits of recreation occur as they have in the past.	Surface water elevations below 1565 feet affect access and recreational use and, in turn, some recreation-oriented businesses. Lower water levels may curtail recreation visits, which would result in lower expenditures at a few recreation-related businesses near the lake. Overall, economic impacts on the economy of Grant County are negligible. The effect on net benefits of recreation within the county is indeterminate.
Irrigated agriculture	Full delivery of water to CBP[4] farmers.	Full delivery of water to CBP farmers.
Historic resources	Same as historically. Eighty-two historical properties appear to be affected from erosion.	Surveys would be conducted in the drawdown zone between elevations 1570 and 1560.
Traditional cultural properties	Same as historically. Nine TCPs would be affected; three are believed to be eligible to National Register.	It is probable that more TCPs lie in drawdown area below elevation 1565 feet.
Indian trust assets	Some areas can no longer support traditional uses; no additional impacts.	No additional impact.

Table S-1.—Summary comparison of the environmental consequences of the alternatives, continued

Affected resource	No Action Alternative	Action Alternative
Environmental justice	No impacts were identified.	No impacts.
Surface water quality	Temperature and stratification will continue to change with changes in water elevation and meteorological conditions.	Mixing may shift 1 or 2 weeks earlier in the fall due to greater mixing and heating of the lake surface.
Groundwater quality	Concentrations of chemicals and groundwater levels will fluctuate with the elevation of Banks Lake.	Water level may change in the short term but will return to normal during refill. No change in existing concentration trends.
Native American sacred sites	No impacts were identified.	No impacts.
Visual quality	Approximately 1,300 acres of an unvegetated bathtub ring between elevations 1565 and 1570 feet.	Approximately 2,500 acres of an unvegetated bathtub ring between elevations 1570 and 1560 feet.
Air quality	No impacts.	No impacts.
Soils	Impacts by erosion would continue.	No additional impacts.
Social environment Public health	For some, as operation of Banks Lake will not change, values will not be affected. For others who value increased water for endangered salmon runs, their values will not be upheld. Lake drawdowns in late summer likely have negative impacts to mosquito production, resulting in lesser likelihood of mosquito borne disease, such as West Nile Virus.	The values of those who desire increased water for endangered salmon runs will be upheld. The values of those desiring higher lake levels would not be upheld. In the drawdown area, little or no shallow ponding areas were evident for mosquito use. Therefore, little likelihood of additional risk of mosquito borne disease, such as West Nile Virus.

[1] Federal Columbia River Power System
[2] Grand Coulee Project Hydroelectric Authority
[3] Public Utility District
[4] Columbia Basin Project

Environmental Commitments for the Action Alternative

The following describes the environmental commitments that Reclamation will include in the Record of Decision if the Action Alternative is implemented. Environmental commitments include any mitigation measures identified for the resource components evaluated in chapter 4, as well as commitments made in response to the Fish and Wildlife Coordination Act Report recommendations. However, the preferred alternative identified in this document is the No Action Alternative and these environmental commitments would not be necessary or implemented if the No Action Alternative is selected for implementation.

Recreation

Extending boat launches, modifying mooring docks, and dredging deeper channels would improve watercraft access at lower water levels. Funds would be provided to ensure that usable boat ramps, courtesy docks, and swimming areas still exist on both the north and south ends of Banks Lake so that public access would be maintained to the lake for recreational purposes.

Historic Resources

Historic resources that are eligible for the National Register must be managed, and they are eligible for the register until they are determined ineligible. Of concern, however, is that none of the identified properties have yet been formally evaluated for the National Register. This, in itself, is a large task, and it is reasonable to assume that a majority of the known historic resources would be determined ineligible. Nevertheless, an unknown number would be eligible, and management treatments for them present yet another large task. Some of these treatments may involve data recovery, some may safely be left alone, and others may require conservation measures to prevent damage from natural forces.

If the Action Alternative is selected, Reclamation will conduct archeological surveys of the lands exposed by the additional 5-foot drawdown and would complete test excavations to determine site eligibility. In consultation with SHPO and the tribes, Reclamation would define treatments to protect or mitigate impacts to the most significant historic properties.

Traditional Cultural Properties

Management of traditional cultural properties is a relatively new component of historic preservation and few protocols exist to protect them without a Federal action, as well as provide mitigation in the face of an agency action. In a landscape, such as Banks Lake, where the native cultures are strongly associated, non-material values, such as traditional cultural properties, are difficult to quantify and protect. Evaluation of three known TCP sites within the drawdown area elevation of 1570 to 1565 feet will occur.

Reclamation will consult with tribes to further define actions that might reduce or avoid impacts to National Register eligible TCPs. To the extent consistent with agency authority and multiple use project purposes, Reclamation will implement actions to avoid or reduce impacts.

Coordination Act Report Recommendations

In accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 USC 661 et seq.), the U.S. Fish and Wildlife Service (Service) provided a final Coordination Act Report documenting wildlife resources, habitat, and management concerns within the drawdown study area (Service, 2002) to assist in developing this document.

If the Action Alternative is implemented, Reclamation will implement the following recommendations contained in the Coordination Act Report:

- Some mitigation actions for various adverse impacts (existing and potential future impacts) could include the establishment of native riparian vegetation in various areas of the drawdown zone, such as native bunchgrasses and forbs in shrub-steppe and riparian vegetation along the shorelines. The limited time frame of this drawdown may limit the logistical feasibility of this mitigation.

- If the 10-foot drawdown is implemented, Reclamation should ensure timely refill of Banks Lake up to 1565 feet by early September to ensure operation of net-pens.

- Reclamation shall work collaboratively with the WDFW and the Service to develop studies that would examine the effects or lack of effects of the proposed drawdown on rearing fish species in Banks Lake.

- The Service recommends Reclamation develop a short-term plan that would address potential modifications of current boat ramp and moorage facilities in order to facilitate summer use activities.

- Reclamation should ensure that a complement of riparian vegetation be maintained along the Banks Lake drawdown zone and that conditions should be sufficient to provide for short-term input of nutrients into the water column as Banks Lake approaches its refill goal.

- A study to determine the reproductive success of western grebes in the study area should be initiated to help determine the level of management that should be applied to protect these birds in light of the proposed drawdown.

- Hatchery compensation via the WDFW is an option that Reclamation should pursue if lack of recruitment for certain fish populations is linked to the proposed drawdown.

- Protection of habitat, such as shrub-steppe, from fire is important, in this region because it does not recover quickly from fire. Attempts should be made to ensure shoreline access to water resources in the event of uncontrolled wildfire in these designated shrub-steppe areas.

- Updating the GIS [geographic information system] work that was done at Banks Lake by Reclamation would be valuable. Aside from changes that will occur over time, this would allow some of the errors the Service identified in its 1998 Planning Aid Memorandum (U.S. Fish and Wildlife Service 1998) to be corrected and a more accurate vegetation map to be generated to determine potential wetland impacts linked to the drawdown and concurrent management actions.

- Reclamation should initiate studies to examine the potential effects of the drawdown on wildlife species.

Contents

Chapter 1—Purpose of and Need for Action **1**
Purpose and Need 1
Decisions to be Made 2
Scope 2
Scoping Process and Issues 2
Permits Required for Implementation 3
General Description of the Area 3
Other Related Actions and Activities 5

Chapter 2—Alternatives **9**
Alternatives Development Process 9
Alternatives Considered in Detail 12
No Action Alternative—Preferred Alternative 13
Action Alternative 14
Alternatives Considered but Eliminated 18
Summary Comparison of Alternatives 19

Chapter 3—Affected Environment **23**
Vegetation, Fish, and Wildlife 23
Threatened, Endangered, and Special Status Species 38
Recreation 50
Economics 54
Irrigated Agriculture 62
Historic Resources 63
Traditional Cultural Properties 65
Native American Sacred Sites 65
Indian Trust Assets 66
Environmental Justice 67
Surface Water Quality 68
Groundwater Quality 69
Visual Quality 71
Air Quality 72
Soils 73
Social Environment and Public Health 73

Chapter 4—Environmental Consequences.. 77
Vegetation, Fish, and Wildlife 77
Threatened, Endangered, and Special Status Species 95
Recreation 100
Economics... 102
Irrigated Agriculture 113
Historic Resources 113
Traditional Cultural Properties 115
Native American Sacred Sites 115
Indian Trust Assets 116
Environmental Justice... 116
Surface Water Quality... 117
Groundwater Quality 121
Visual Quality 121
Air Quality 121
Soils 121
Social Environment and Public Health 122
Cumulative Impacts 124
Unavoidable Adverse Impacts 126
Relationship Between Short-Term Uses and Long-Term Productivity........ 126
Irreversible and Irretrievable Commitments of Resources 127

Chapter 5—Consultation and Coordination 129
Public Involvement 129
Coordination and Consultation 134

Distribution List.. 141

List of Preparers 149

Glossary 151

Bibliography 161

Index... 175

Appendix A—Fish and Wildlife Coordination
Appendix B—Scoping Summary Report
Appendix C—Hydrologic Report
Appendix D—Tribal Correspondence
Appendix E—Environmental Commitments

Figures

2-1 The range of average flows at McNary Dam for August 1 through 15... 11
2-2 The range of average flows at McNary Dam for August 16 through 31. 11
2-3 The four scenarios for the No Action Alternative. 15
2-4 The four scenarios for the Action Alternative. 15
3-1 Aquatic macrophytes are common in Banks Lake in coves, bays, and shorelines protected from wind and wave action. 25
3-2 North Banks Lake . ... follows page 26
3-3 South Banks Lake .... follows page 26
3-4 Eroding banks threaten a mature cotton- wood near the Million Dollar Mile South Boat Ramp. 28
3-5 Shallow unvegetated flats, like this one near Baker Flat, provide good habitat for many species of fish. 34
3-6 Much of the shoreline along Banks Lake consists of sand, gravel, cobble, and boulders. These are generally exposed to wind and wave action. 35

Tables

2-1 Summary of Banks Lake elevation under No Action and Action Alternatives 17
2-2 Summary comparison of the environmental consequences of the alternatives 20
3-1 Drawdown tolerance for aquatic macrophytes species characteristic of the habitat at Banks Lake 27
3-2 Drought tolerance of riparian species at Banks Lake 29
3-3 Characteristics of Banks Lake fish species... 31
3-4 Wildlife of the Banks Lake littoral zone and lake surface 38
3-5 Visitation to Grand Coulee/Banks Lake area, FY 1997 51
3-6 Boat launch sites and operation and maintenance responsibilities.......... 53
3-7 Employment and income data for Grant County, 1999........................... 60
3-8 Number of jobs by industry for Grant County and North Grant County 61
3-9 Available water supply to meet demands 63

3-10 Total population and minority data for Grant County and Washington State 67
3-11 Scenic quality ratings, Banks Lake, Washington 72
4-1 Number of days aquatic macrophytes are exposed during drawdown. Aquatic macrophytes generally occur in Banks Lake from elevation 1569 feet to 1566 feet 78
4-2 Summary of impacts to aquatic macrophyte species in the Banks Lake littoral zone 83
4-3 Summary of impacts to riparian species present in the Banks Lake littoral zone. 84
4-4 Summary of impacts to quantity and quality of spawning and nursery habitat 90
4-5 Summary of impacts —Susceptibility of juvenile fish to predation 90
4-6 Summary of impacts to the quantity and quality of the aquatic food base 92
4-7 Summary of impacts to wildlife 94
4-8 Summary of impacts to species of concern 99
4-9 FCRPS energy generation No Action Alternative (MWh and $). 104
4-10 FCRPS energy generation Action Alternative (MWh and $). 104
4-11 Net FCRPS energy impacts from Banks Lake operational changes (MWh and $). 106
4-12 GCPHA power generation—No Action Alternative 106
4-13 GCPHA power generation—Action Alternative 107
4-14 GCPHA power generation impacts 107
4-15 Energy impacts to PUD powerplants on the Columbia River (MWh). . 108
4-16 Summary of Banks Lake elevation under No Action and Action Alternatives 111

Acronyms and Abbreviations

ADA	Americans with Disabilities Act
ACHP	Advisory Council on Historic Preservation
ARPA	Archeological Resources Protection Act
BASS	Bass Anglers Sportsman Society
BiOp	Biological Opinion
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CAR	Coordination Act Report
CBP	Columbia Basin Project
CBWA	Columbia Basin Wildlife Area
CCT	Confederated Tribes of the Colville Reservation
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Corps	U.S. Army Corps of Engineers
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCRPS	Federal Columbia River Power System
FDR	Franklin D. Roosevelt
FONSI	Finding of no significant impact
Service	U.S. Fish and Wildlife Service
GCPHA	Grand Coulee Project Hydroelectric Authority
HLH	Heavy load hours
Implan	Impact Analysis for Planning
ITA	Indian Trust Asset
kaf	Thousand acre-feet
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatthour
LLH	Light load hours
MCL	Maximum contaminant levels
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MW	Megawatt
MWh	Megawatthour

NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NOI	Notice of Intent
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
O&M	Operation and maintenance
ORV	Off-road vehicle
PCPI	Per capita personal income
P/G	Pump/generator
PUD	Public Utility District
PWC	Personal water craft
Reclamation	Bureau of Reclamation
RMP	Resource Management Plan
RPA	Reasonable and Prudent Alternative
RV	Recreational vehicle
Spokane Tribe	Spokane Tribe of Indians
SPRC	Washington State Parks and Recreation Commission
SRSP	Steamboat Rock State Park
TCP	Traditional Cultural Property
USC	U.S. Code
USFS	U.S. Department of Agriculture, Forest Service
USGS	U.S. Geological Survey
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDOE	Washington Department of Ecology
WSIGWC	Washington State Interagency Ground Water Committee
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation

Note: The National Marine Fisheries Service (NMFS) issued a Biological Opinion (BiOp) in 2000. After that time, they became known as the National Oceanic and Atmospheric Administration (NOAA) Fisheries. For activities in 2000, they are referred to as NMFS. For later and current activities, they are referred to as NOAA Fisheries.

Chapter 1

Purpose of and Need for Action

In December 2000, the National Marine Fisheries Service (NMFS—now the National Oceanic and Atmospheric Administration [NOAA] Fisheries) issued a Biological Opinion (BiOp) for operations of the Federal Columbia River Power System (FCRPS) http://www.nwr.noaa.gov/1hydrop/hydroweb/docs/Final/2000Biop.html (NMFS 2000). The BiOp included a Reasonable and Prudent Alternative (RPA), of which Action 31 advised the Bureau of Reclamation (Reclamation) to "assess the likely environmental effects of operation of Banks Lake up to 10 feet down from full pool during August."

This final environmental impact statement (EIS) analyzes the lowering of the August water surface elevation of Banks Lake. Under current historical August operations, the reservoir may be lowered from its maximum water surface elevation of 1570 feet to a minimum water surface elevation of 1565 feet. Reclamation is evaluating a change to the historic August operations of lowering Banks Lake water surface elevation to 1560 feet annually.

This EIS is prepared in compliance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations, and the Endangered Species Act of 1973, as amended (ESA). A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on April 25, 2001.

Purpose and Need

The purpose of the action is to enhance the probability of meeting flow objectives in the Columbia River at McNary Dam by altering the August drawdown of Banks Lake from water surface elevation 1565 feet to water surface elevation 1560 feet annually. The action would enhance flows during the juvenile out-migration of ESA-listed salmonid stocks (specifically Snake River fall chinook salmon) during August. This analysis complies with Action 31 of the Reasonable and Prudent Alternative of the Federal Columbia River Power System Biological Opinion, issued by the National Marine Fisheries Service (now National Oceanic and Atmospheric Administration [NOAA] Fisheries) on December 21, 2000.

The need is to provide increased flows in the Columbia River for ESA-listed salmonid stocks by modifying Banks Lake's operations.

Decisions to be Made

Reclamation must decide whether or not to implement the action. The preferred alternative is the No Action Alternative. A final decision will be made and documented as a Record of Decision no sooner than 30 days after EPA issues its notice that the EIS is available for review.

Scope

This EIS describes and analyzes the impacts of an additional 5-foot drawdown of water surface elevation in Banks Lake in August as requested in the NMFS BiOp. The study area includes Banks Lake and its surrounding areas.

Except for the Low Water year scenario which starts around July 22, the period of the EIS analysis extends each year from August 1 through September 22. Specifically, the proposed drawdown to water surface elevation 1560 feet may extend from August 1 to August 31, while the refill to water surface elevation 1565 feet would begin on September 1 and generally be completed by September 10. Refill to elevation 1570 feet would usually be complete by September 22. This analysis, and subsequent decision, is not intended to influence or change the normal authorized operation at Banks Lake.

Scoping Process and Issues

The scoping process for the EIS began officially in April 2001 when the Federal Register notice of intent to prepare an EIS was published. Reclamation held a public meeting in May 2001 in Coulee City, Washington. A more detailed description of the scoping process can be found in Chapter 5, Consultation and Coordination, and in appendix B, Scoping Summary Report (Reclamation, 2001).

The issues identified during this process were considered throughout the discussion of the affected environment and environmental consequences. They are:

- Lake elevations, instream flows, and water quality
- Irrigation deliveries
- Fish and wildlife
- Threatened and endangered species
- Recreation
- Public safety—roads, boating, and fire hazards
- Cultural resources
- Economics, particularly for local economy and power

Some of the issues expressed during the scoping process are outside the scope of this EIS. These relate to stopping salmon fishing, a drawdown of Lake Roosevelt, water monitoring, fish stocking, and justification for additional water.

Permits Required for Implementation

Reclamation would not be required to obtain any permits to implement the action. Implementation of either of the alternatives is within Reclamation's current authorization.

General Description of the Area

Banks Lake, one of the principal reservoirs of the Columbia Basin Project (CBP), lies primarily within Grant County, but portions of the western shoreline extends into Douglas County. It occupies the floor of the upper Grand Coulee between the towns of Grand Coulee and Coulee City in central Washington.

Banks Lake is a reregulating reservoir, which was created by damming the Grand Coulee with two dams. The northern end of Banks Lake is enclosed by North Dam, which is a 1,450-foot long earth-filled dam 145 feet high. The southern end of Banks Lake is defined by Dry Falls Dam, with a crest length of 9,800 feet and 123 feet high. Banks Lake is 27 miles long and has a surface area of about 27,400 acres at full pool. U.S. Highway 2 crosses the crest of Dry Falls Dam. The active capacity of Banks Lake is 715,000 acre feet; total capacity is 1 million acre-feet of water at the reservoir's full pool elevation of 1570 feet.

Banks Lake Operations

The water supply for Banks Lake is stored behind Grand Coulee Dam in Franklin D. Roosevelt (FDR) Lake (also known as Lake Roosevelt). Water from FDR Lake is pumped into the Feeder Canal at the North Dam, which then flows into Banks Lake. The Feeder Canal has a capacity of 16,000 cubic feet per second (cfs), a base width of 80 feet, and a depth of 20 feet at full pool.

The Grand Coulee pump-generating plant consists of 12 units. Six of the units are pumps, each rated at 65,000 horsepower and have a capacity to pump 1,600 cubic feet per second (cfs) at a 292- to 310-foot head. The other six units are pump-generators that pump water to Banks Lake and can generate power when water from Banks Lake flows back to FDR Lake. These six units are capable of generating 300 megawatts (MW) of power at full capacity. The six pump-generators are rated between 67,500 and 70,000 horsepower and can pump between 1,600 and 1,700 cfs.

The Banks Lake water surface elevation normally fluctuates approximately 3 to 5 feet from full pool, with the highest water levels typically in June and the lowest levels in

November. The reservoir may occasionally be drafted significantly lower for special operations or maintenance activities.

From 1992 through 1999, the Banks Lake water surface elevation has fluctuated from about water surface elevation 1570 feet to 1545 feet. The lowest water surface elevation was reached in late 1994 and early 1995 when the reservoir was sharply lowered to perform maintenance on constructed facilities and to reduce an infestation of Eurasian milfoil in the reservoir area. In September 1993, the water surface elevation of Banks Lake was lowered to about water surface elevation 1565 feet for maintenance of canal gates. Operational recommendations by Columbia River managers in April 1995 and August 1998 left Banks Lake near water surface elevation 1565 feet for short (i.e., month-long) periods. Except for these periods, the water surface elevation of Banks Lake fluctuated in a narrow range from about water surface elevation 1570 feet to elevation 1568 feet between 1992 and 1999. Since 2000, Banks Lake has drafted to elevation 1565 feet every August.

Since its construction in the early 1950s, Banks Lake has been operated and maintained for the storage and delivery of irrigation water drawn from the Columbia River to CBP lands. At Dry Falls Dam (on the southern end of the lake), water is delivered to the Main Canal in two ways: (1) through a low-head powerplant operated by the Grand Coulee Project Hydroelectric Authority (GCPHA), a municipal entity, or (2) through an outlet works, where access to the outlet works for fish is limited by a barrier net that was installed and maintained by GCPHA. The Main Canal has a capacity of 10,000 cfs, and water can be delivered at that rate until Banks Lake water surface lowers to reach elevation 1537 feet. From the Main Canal, water flows south from Banks Lake to the northern portion of the CBP's irrigable area. Reclamation operates the lake within established constraints on water surface elevation to meet contractual obligations, ensure public safety, and protect property. Reclamation considers other resource needs when feasible within existing operational constraints.

Approximately 670,000 acres are irrigated in the CBP. Up to 67 different crops are grown, with alfalfa, potatoes, apples, and vegetables being major contributors to more than a half billion dollars of crop value each year. Reclamation currently diverts about 2.6 million acre-feet of water from the Columbia River for delivery to irrigators within the CBP. Reclamation utilizes a water right from the State of Washington, which the United States holds in trust for the irrigators.

Setting

The watershed is limited to a relatively small area immediately surrounding the reservoir. Most streams draining to the reservoir are intermittent. The natural drainage basin, including the lake surface area is about 278 square miles in size. Gently rolling terrain is typical throughout the basin. The lands surrounding the reservoir support a rich vegetative mosaic of shrub-steppe, mesic shrub, upland forest, and riparian/wetland communities, many of which the Washington Department of Fish and Wildlife (WDFW) has identified as "priority habitats." The area supports a variety of wildlife. The riparian habitats along perennial streams and shorelines provide important winter roosting areas for many bird species, including the bald eagle. The islands at the southern end of the reservoir provide habitat for colonial nesting birds and waterfowl. Important waterfowl breeding areas include Devil's Punch Bowl, Osborn Bay, and the wetlands and waters located at the south end of Steamboat Rock peninsula and below Dry Falls Dam.

The steep basalt and rhyolite cliffs of the Grand Coulee encompass the lake and limit human access and activity in the area, particularly on the reservoir's west side. State Route 155 is the primary travel corridor along the reservoir's eastern shore between Coulee City at the south end of the lake and Electric City/Grand Coulee at the lake's north end. The Banks Lake area is also served by local city and county roads. Some shoreline areas are primarily accessed via the reservoir's primitive road network. These roads are generally unmaintained, two-track dirt roads that often require the use of high-clearance four-wheel drive vehicles. Other shoreline areas can only be accessed by boat.

Reclamation lands in the study area are managed by the Washington State Parks and Recreation Commission (SPRC) and the WDFW under agreements signed in 2003. These agreements were successors to a lease with Washington State for management that was signed in 1952. On the lands managed by each agency, they are primarily responsible for leasing or permitting activities to third parties. Specific areas of the reservoir are managed by Reclamation, and concession or third party agreements are developed and administered by Reclamation. The SPRC is primarily responsible for public activities in the Steamboat Rock area, including the Northrup Canyon Natural Area which is outside the study area.

The Washington Department of Natural Resources (WDNR) maintains jurisdiction over school endowment lands and administers Sunbanks Resort on Banks Lake. Grant County provides law enforcement services in the study area. To ensure proper operation and protection of the reservoir, Reclamation maintains primary jurisdiction over developments in the Reclamation Zone, which includes North Dam, Dry Falls Dam, and their appurtenant works.

Other Related Actions and Activities

Reclamation, WDFW, and SPRC are currently involved in several related projects and activities that could affect future resource conditions and management decisions at Banks Lake. Similarly, other agencies are also involved in a range of activities that may have a bearing on Banks Lake resource conditions and management.

The following provides a brief description of each of these projects. For each project, mitigation measures and best management practices are expected to be employed to reduce adverse effects and to comply with Federal, State, and local laws and regulations.

Environmental Assessment—Banks Lake Resources Management Plan

Reclamation prepared an environmental assessment (EA) for the proposed Banks Lake Resources Management Plan (RMP). On March 23, 2001, the Acting Regional Director of Reclamation's Pacific Northwest Region approved a finding of no significant impact (FONSI) for the Preferred Alternative evaluated in the EA.

The FONSI described an alternative that balanced natural resource conservation with limited recreational development and reflected the management agencies and the public's long-term vision for Banks Lake. The selected alternative included development of recreation areas and "designated" dispersed camping areas to accommodate demand for recreation facilities and sites, and to direct use to specific areas environmentally suited for public use.

The Banks Lake RMP was completed in the summer of 2001 and is being implemented.

Federal Columbia River Power System Operations Biological Opinion

The National Marine Fisheries Service prepared a Biological Opinion concerning the operations of the Federal hydropower facilities in the Columbia and Snake River basins (NMFS 2000). Reclamation has prepared this EIS to meet Action 31 of the RPA for that BiOp.

Grant County Comprehensive Plan

The Grant County Comprehensive Plan was adopted in September 1999 pursuant to the Washington State Growth Management Act. The updated Plan addresses land use, critical areas and resource lands, housing, transportation, capital facilities, and utilities within county boundaries. Specific to the "Open Space and Recreation" designation that encompasses the RMP study area, the Growth Management Act goal for these lands encourages the retention of open space, the development of recreational opportunities, the conservation of fish and wildlife habitat, and access to natural resource lands and water.

Steamboat Rock Bald Eagle Nest Territory Management Plan

In 1991, the SPRC and WDFW cooperatively developed and adopted the conservation measures described in the Steamboat Rock Bald Eagle Nest Territory Management Plan. The purpose of the management plan is "to create site-specific management procedures that maintain a productive eagle nest territory and integrate the management interests and goals of the land managers" (WDFW 1991). The emphasis of the plan is to preserve nesting, roosting, and foraging habitats in the Steamboat Rock bald eagle nesting territory at Banks Lake.

Castle Rock Natural Area Preserve Management Plan

The 680-acre Castle Rock Natural Area Preserve lies adjacent to the study area in Northrup Canyon and is part of the Steamboat Rock State Park Recreation Area administered by the SPRC. In 1989, the SPRC and WDNR jointly prepared the Draft Castle Rock Natural Area Preserve Management Plan to protect natural features of scientific or educational significance. Although never formally adopted, the 1989 plan outlines the policies and management guidelines under which the Preserve is managed.

Grant County Shorelines Management Master Program

Banks Lake is listed as a shoreline of statewide significance in the Grant County Shorelines Management Master Program (Washington Administrative Code (WAC) State Rule 173-20-290).

Douglas County Comprehensive Plan

This Comprehensive Plan was adopted in 1995. Douglas County lands adjacent to the study area are designated for dryland agriculture.

Spokane Resource Management Plan

In 1987, the Spokane District of the Bureau of Land Management (BLM) prepared the Spokane RMP to more effectively manage public lands in the District. Approximately 40 BLM scattered tracts are located within 2 miles of the Banks Lake study area.

Groundwater Management Area

In 1998, under recommendation of the Washington State Interagency Ground Water Committee (WSIGWC), a groundwater management area was established that encompasses Grant, Adams, and Franklin Counties. The State, in cooperation with the county health districts, monitors nitrate levels in public water supplies, including those at Banks Lake.

Columbia Basin Wildlife Area Management Plan

As part of the WDFW's public holdings, the Columbia Basin Wildlife Area (CBWA) incorporates many scattered tracts of land developed as a result of Reclamation's CBP. In 1997, the plan was drafted to provide guidance for the management of these tracts. While Banks Lake is one of the 16 management units within the CBWA, no specific wildlife management proposals or activities have yet been developed for the Banks Lake unit.

Chapter 2

Alternatives

This chapter briefly discusses the alternative development process and describes in detail the No Action and the Action Alternatives. This chapter also describes several alternatives that were eliminated from further consideration.

Alternatives Development Process

Banks Lake reservoir is authorized to operate between the full pool water surface elevation of 1570 feet and a minimum water surface elevation of 1545 feet at any time of the year. However, since 1981, the August reservoir water surface elevation of Banks Lake has ranged between 1569.5 feet and 1565 feet. Since 1998, Reclamation has drafted 5 feet from Banks Lake in August to enhance flow augmentation at McNary Dam. This operation was incorporated into the NMFS 2000 FCRPS Biological Opinion (BiOp) as RPA action 23, which states that Banks Lake is to be drafted 5 feet in August. Reclamation has determined that the operation of Banks Lake water surface elevation between 1565 and 1570 feet constitutes the most likely future August operations and was determined to be the No Action Alternative.

During the development of the 2000 FCRPS BiOp, NMFS considered how fish passage in the Columbia River could be further optimized by using additional water from Banks Lake between water surface elevations 1565 and 1560 feet and included RPA Action 31, which advised Reclamation to consider the environmental impacts of lowering the August Banks Lake water surface elevation to 1560 feet. This EIS was written to analyze those environmental effects.

BPA ran operational models of the Columbia River to show the potential increase in available water to provide for flows for juvenile fish migration and to look at the effects on generating capacity of the FCRPS. BPA used the hydro-simulation model (HYD-SIM) that they developed for power operations. The primary focus of this EIS was to quantify the potential contribution of the volume of the proposed draft at Banks Lake in meeting flow targets for the Columbia River at McNary Dam, located downstream from Grand Coulee Dam.

Output of the HYD-SIM studies reflect operations of the FCRPS in compliance with the 2000 BiOp. The model simulates system operations using the historic hydrologic and meteorologic data sets from 1929 to 1978. The data also contain 1990-level irrigation depletions and adjustments to these 1990-level modified stream flows due to Reclamation's updated Grand Coulee pumping schedule for Banks Lake. The model simulates operations for the FCRPS based on meeting the authorized project requirements and attempting to meet BiOp RPA actions. Model results reflect average monthly discharges at each dam based on a continuous operation over the 50-year period from 1929-1978.

The results of the modeling are presented in terms of flow increments and changes to the number of years that the Columbia River flow target at McNary Dam (200,000 cfs/day) is met in each of the halves of August (table 1, appendix C). Resource managers prescribe conditions necessary for salmon outmigration during these periods. From 1929 to 1978, the average discharge of the Columbia River below McNary reservoir during these periods was 174,660 cfs for August 1-15 and 144,900 cfs for August 16-31.

The available FCRPS modeling includes the draft of Banks Lake to 1565 feet in August, which is part of the No Action Alternative. The analysis of the Action Alternative presented in this EIS simply adds an additional incremental flow volume to the modeled flows at McNary Dam. The draft of Banks Lake was modeled by reducing the pumping of a specified volume from FDR Lake and allowing the irrigation demand to draft Banks Lake to a specific water surface elevation. The volume distributed over a time period yields a flow rate. This flow rate is added directly to the flows at McNary Dam. The volume of water and the time period chosen to deliver the water changes the magnitude of the increment of discharge that is added to McNary Dam flows. The results of the modeling can be presented in terms of flow increments and changes to the number of years that the Columbia River flow target at McNary Dam is met in each of the halves of August (see appendix C). This increment of flow is one of several FCRPS actions that cumulatively increase Columbia River flows for juvenile fish migration.

The equivalent flow rates represent the upper limit to the potential flow contribution for each alternative or configuration. The actual August 1 starting water surface elevation at Banks Lake could be less than water surface elevation 1570 feet. This can occur for a number of reasons such as unplanned pump outages, power emergencies, and electrical problems or for any other unforeseen event. In actual practice, Reclamation would make every reasonable effort to be as close to a pool water surface elevation of 1570 feet as practicable on August 1.

The data used in model simulations include a wide range of annual flow volumes, and the timing of the runoff can be completely different between similar runoff volumes. Figures 2-1 and 2-2 illustrate the range of monthly flows at McNary Dam for August found in the simulation data set. Median flows range from about 180,000 cfs the first half of August and 140,000 cfs the second half of August at McNary Dam.

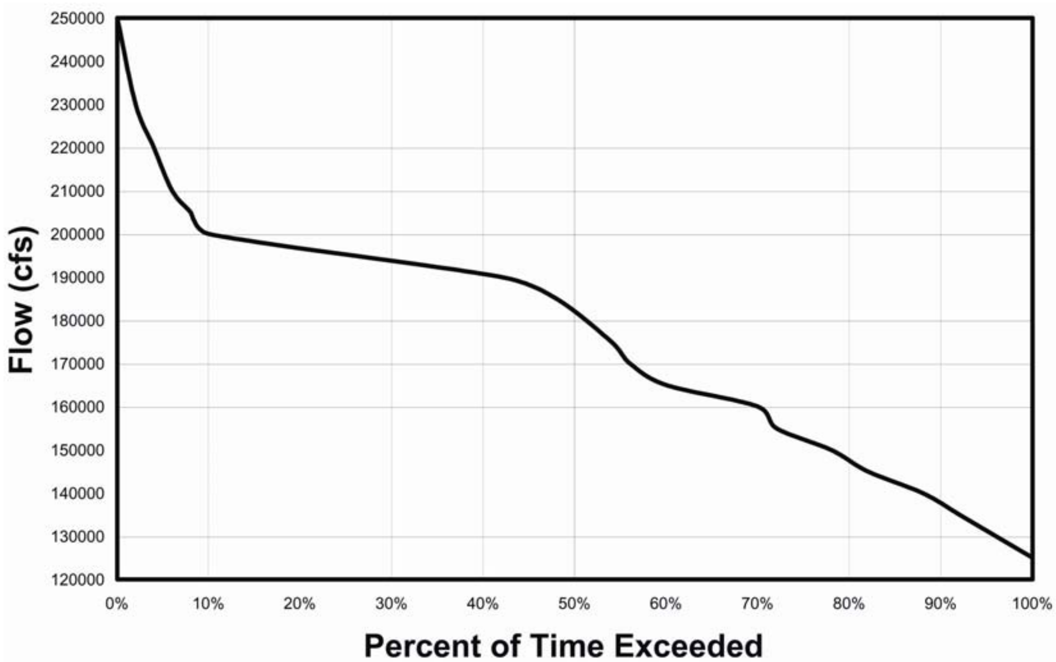


Figure 2-1.—The range of average flows at McNary Dam for August 1 through 15.

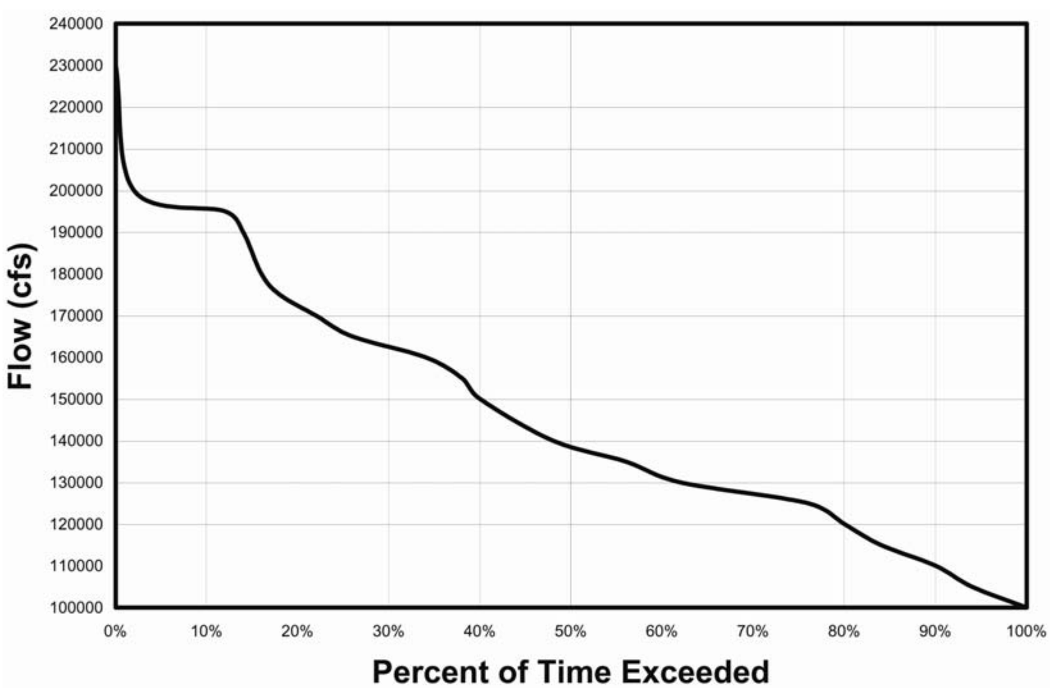


Figure 2-2.—The range of average flows at McNary Dam for August 16 through 31.

The FCRPS model shows impacts to the lower river and analyzes September on a monthly basis. Even though Reclamation shows a rapid refill to elevation 1569 feet, then slows the rate of refill for modeling purposes, McNary flow impact is expressed in average flow change over the month of September. There are no flow targets on the Columbia River in September, and September flows are relatively consistent year to year. Reclamation describes impacts in terms of the average impact in September over a 50-year period, instead of performing a 50-year study.

Reclamation considered several alternative methods to lower the Banks Lake water surface elevation to 1560 feet. Alternatives developed early in the process considered specific August dates with specific water surface elevations that would provide water for flows during specific times of the month. However, Columbia River flows vary. The additional flows needed in the Columbia River will differ greatly over a 50-year period, and possibly even in consecutive years. Providing a specific August date for when the Banks Lake water would be available to increase Columbia River flows would unnecessarily restrict the ability to meet fishery needs based on the dynamics of river flows.

To increase potential flexibility to optimize fish passage, Reclamation required an alternative that would allow the Banks Lake water to be used for each year's specific August fish passage needs. One alternative was developed that would allow Reclamation to operate Banks Lake between water surface elevations 1570 and 1560 feet. Scenarios were developed to illustrate how the water surface elevation of 1560 feet could potentially be reached. The No Action and the Action Alternatives are described below.

Alternatives Considered in Detail

Two alternatives are described and analyzed in this EIS. The first alternative is the No Action Alternative, which describes the Banks Lake August water surface elevations that would occur if Reclamation decided not to implement the Action Alternative. Four scenarios on how the water surface elevation of 1565 feet by August 31 could be achieved are presented. These scenarios vary, depending upon the hydrology of any particular year. The Action Alternative describes the proposed operational modification of August water surface elevations to achieve 1560 feet elevation by August 31. Four scenarios are presented to illustrate how this water surface elevation could be potentially reached.

There may be conditions when Reclamation would not provide the drawdown described in the No Action and Action Alternatives. In addition, in some years drawdown may be more than that described in the alternatives. Conditions that may trigger a lesser or greater drawdown could include, but are not limited to (1) mechanical limitations to pumping capacity, (2) low water years when flows in September are predicted to be insufficient to supply refill water, (3) high water years when the contribution of Banks Lake is not needed to meet flow targets, (4) years when energy demand is predicted to limit the amount of power available for refill during early September, and (5) drawdown for maintenance needs. Even during years with these types of conditions, partial drawdown might be possible. Conditions that would preclude drawdowns are anticipated to occur infrequently.

For the analysis in this EIS, it is assumed that Banks Lake would be operated as described in the alternatives, with the scenario dependent on the hydrology of any given year. Impacts resulting from the infrequent changes to the described operation would be evaluated on a case specific basis with appropriate NEPA compliance being conducted at that time.

No Action Alternative—Preferred Alternative

Under No Action, Banks Lake water surface would normally range between water surface elevation 1570 feet and elevation 1565 feet between August 1 and September 22. The goal and maximum possible draft of Banks Lake in August would be from water surface elevation 1570 feet to 1565 feet, based on RPA Action 23 of NMFS 2000 BiOp, which states that Reclamation shall operate Banks Lake at an elevation 5 feet from full pool during August. Approximately 133,600 acre-feet of water, the volume between elevation 1570 and 1565 feet, would be available to increase streamflow for fish migration targets during August. Under the No Action Alternative, Reclamation would still have the discretion to manage the lake level to other water surface elevations for authorized purposes. Three different scenarios to draft this volume of water in August were modeled, while another scenario assumed no draft during August.

Scenarios consist of Low Water, an Early Draft, a Uniform Draft, and a Late Draft. The Low Water scenario assumes that Banks Lake is at water surface elevation 1565 feet on August 1, while the remaining three scenarios assume that the water surface is at elevation 1570 feet on August 1.

Drawdown

The four different drawdown scenarios have been developed to show the range of conditions that may occur, depending on the hydrology, as the lake is operated between water surface elevations 1570 and 1565 feet. For this analysis, the Low Water Scenario assumes Banks Lake was drafted before the end of July and is at elevation 1565 feet at the beginning of August and remains at that water surface elevation throughout the month. The Early Draft is a linear draft starting at 1570 feet on August 1, reaching water surface elevation 1565 feet at August 10. The Uniform Draft is a linear draft throughout August starting at 1570 feet and going to water surface elevation 1565 feet at the end of the month. The Late Draft remains at water surface elevation 1570 feet until August 21, then drafts linearly to the end of the month to water surface elevation 1565 feet. All four scenarios, as shown in figure 2-3, are evaluated in the EIS.

1. Low Water	Banks Lake water surface elevation at 1565 feet on August 1 and held at that elevation until August 31. Draft would begin no earlier than July 22. Average rate of draft during August = 0.0 feet per day.
2. Early Draft	Draft Banks Lake water surface elevation from 1570 feet on August 1 to elevation 1565 feet on August 10. Average rate of draft = 0.5 foot per day.
3. Uniform Draft	Draft Banks Lake water surface elevation from 1570 feet on August 1 to 1565 feet on August 31. Average rate of draft = 0.16 foot per day.
4. Late Draft	Draft Banks Lake water surface elevation from 1570 feet on August 22 to 1565 feet on August 31. Average rate of draft = 0.5 foot per day.

Refill

Under the No Action Alternative, the September 1 Banks Lake water surface elevation would be no lower than 1565 feet. Projected refill would occur over the period from September 1 until September 22, when the reservoir could reach elevation 1570 feet.

Action Alternative

In the Action Alternative, Banks Lake water surface elevations would range between elevation 1570 feet and 1560 feet between August 1 and September 22 annually (see figure 2-4). Banks Lake water surface elevations could be as low as 1560 feet on August 11. Under the Action Alternative, Reclamation would still have discretion to manage the lake level to other elevations for authorized purposes.

Because normal September water surface elevations typically fluctuate from elevation 1565 feet to 1570 feet, a refill of the reservoir to elevation 1570 feet may be required. Therefore, the Action Alternative includes a refill that begins on September 1, reaching elevation 1565 feet by September 10 and 1570 feet by September 22.

Compared to No Action, the Action Alternative includes drafting an additional 5 feet annually from elevation 1565 feet to 1560 feet, providing an additional 127,200 acre-feet of water. This water would be used to increase the flow volume of the Columbia River at McNary Dam by about 1 to 2 percent during the month of August, compared to No Action. For example, 2,069 cfs (flow increase based on a uniform draft) is about 1 percent of 180,000 cfs and 1.5 percent of 140,000 cfs.

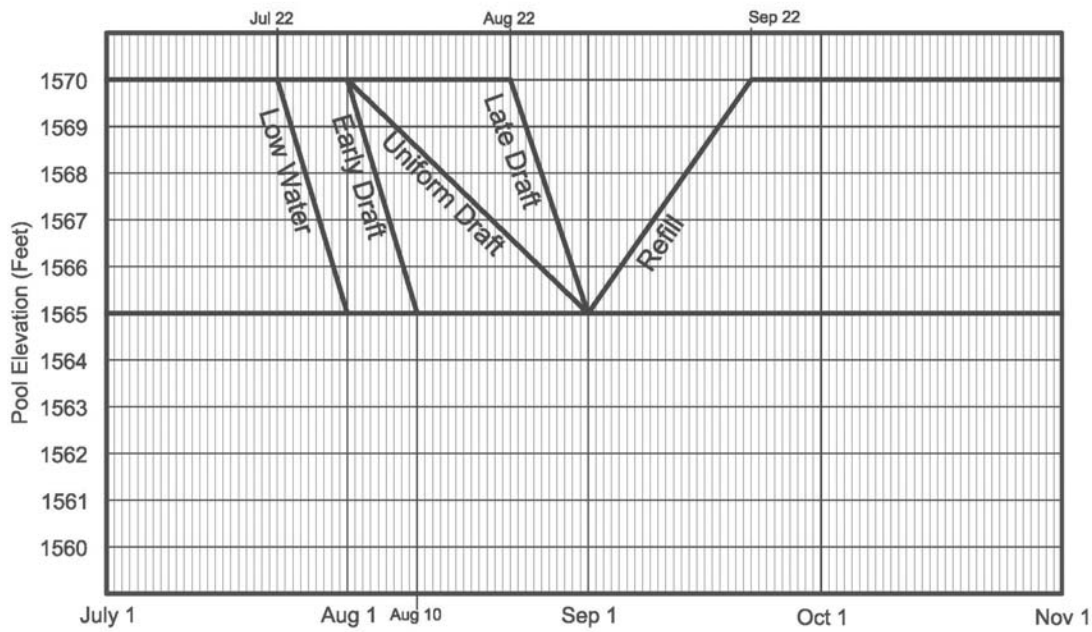


Figure 2-3.—The four scenarios for the No Action Alternative.

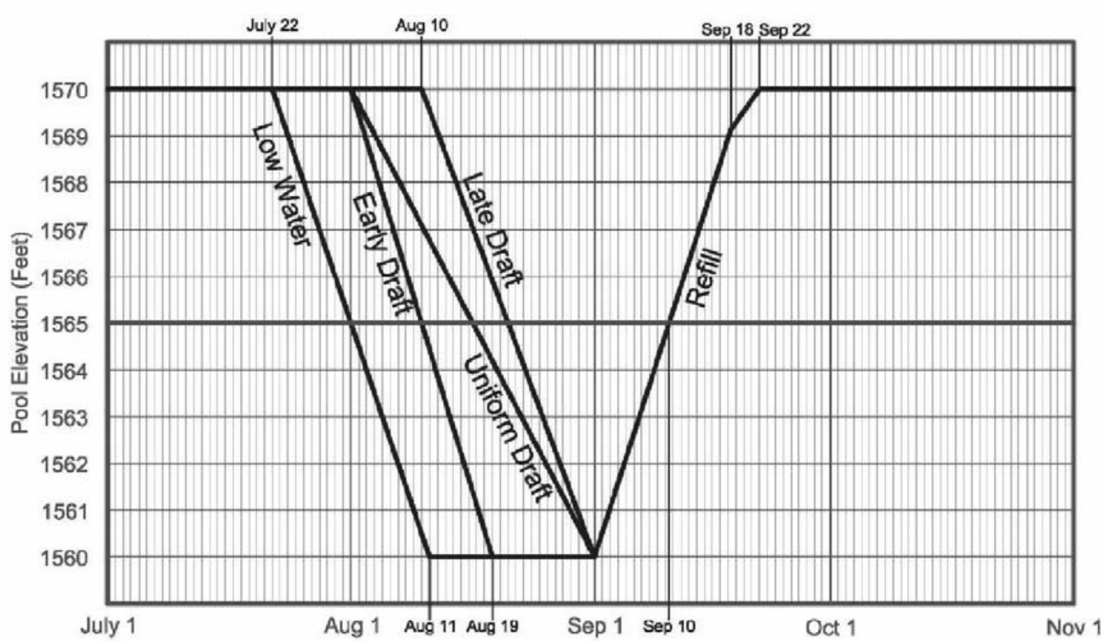


Figure 2-4.—The four scenarios for the Action Alternative.

Drawdown

The timing of possible water releases under the Action Alternative has been evaluated by selecting four scenarios, as shown in figure 2-4. These scenarios consist of a Low Water, Early Draft, Uniform Draft, and a Late Draft. The first scenario assumes that the water surface is at elevation 1565 feet on August 1. The other scenarios assume that the Banks Lake water surface elevation is at 1570 feet on August 1.

1. Low Water — Draft Banks Lake from water surface elevation 1565 feet on August 1 to 1560 feet by August 10, where the water surface elevation will remain until August 31. Draft would begin no earlier than July 22. Average rate of draft = 0.5 foot per day.

2. Early Draft — Draft Banks Lake water surface elevation from 1570 feet on August 1 to 1560 feet by August 20. Banks Lake water surface elevation remains at 1560 feet until August 31. Average rate of draft = 0.5 foot per day.

3. Uniform Draft — Draft Banks Lake water surface elevation from 1570 feet on August 1 to water surface elevation 1560 feet on August 31. Average rate of draft = 0.32 foot per day.

4. Late Draft — Beginning on August 11, draft Banks Lake water surface elevation from 1570 feet to water surface elevation 1560 feet by August 31. Average rate of draft = 0.5 foot per day.

Refill

Under the Action Alternative, August 31 Banks Lake water surface elevation target would be 1560 feet. Refill at the fastest rate possible would start on September 1, would refill to elevation 1565 by September 10, and continue at that rate until approximately September 18, when the reservoir would be at about 1569 feet. (Rate based on pumping both LLH and HLH while meeting irrigation demand. Assumes that two units are unavailable because of annual maintenance outages.) At that time (1569 feet), the Banks Lake water surface elevation would be identical under both the Action and No Action Alternatives and additional refill to elevation 1570 feet would be identical to refill under the No Action Alternative with the reservoir reaching elevation 1570 feet on September 22. Nevertheless, under the Action Alternative, Reclamation would have discretion to manage the lake level to fill at other times for other authorized uses.

The water surface elevation of Banks Lake on August 1 ranged from 1569.8 to 1568 feet from 1981 through 2000. The historic normal operating range during August typically remained above water surface elevation 1568 feet over this 20-year period. If the starting pool water surface elevation is less than 1570 feet, the available flow contributions in August will be less. However, this does not mean that the overall flow contribution to the system is diminished. A starting pool water surface elevation of less than 1570 feet on August 1 may be the result of a flow contribution in July. Approximate daily rates of draft for the No Action and Action Alternatives are shown in table 2-1.

Table 2-1.—Summary of Banks Lake elevation under No Action and Action Alternatives

Altern-ative	Type of draw down	Changes in elevation and volume	Time period	Results: Number of days at different elevations	Results: Potential flow changes (cfs)
No Action	Low water	1565 No Change 0 kaf	Aug. 1-31	31 days at < 1570 ft 31 days at 1565 ft Zero days at < 1565 ft	0
	Early draft	1570-1565 1565 133.6 kaf	Aug. 1-10 Aug. 11-31	31 days at < 1570 ft 21 days at 1565 ft Zero days at < 1565 ft	6,737 - Aug. 1-10
	Uniform draft	1570-1565 133.6 kaf	Aug. 1-31	31 days at < 1570 ft 1 day at 1565 ft Zero days at < 1565 ft	2,173- Aug.1-31
	Late draft	1570 1570-1565 133.6 kaf	Aug. 1-21 Aug. 22-31	21 days at 1570 ft 10 days at < 1570 ft Zero days at < 1565 ft	6,737 - Aug. 22-31
Refill of Banks Lake		1565 - 1569 1569 - 1570	Sep. 1-18 Sep. 19-22	22 days to reach 1570 ft	2,697 Sep. 1-22
Action	Low water	1565-1560 1560 127.2 kaf	Aug. 1-10 Aug. 11-31	31 days at < 1570 ft 31 days at < 1565 ft 21 days at 1560 ft	6,413 - Aug. 1-10
	Early draft	1570-1565 1565-1560 1560 260.8 kaf	Aug. 1-10 Aug. 11-20 Aug. 20-31	31 days at < 1570 ft 21 days at < 1565 ft 11 days at 1560 ft	6,737 - Aug. 1-10 6,413 - Aug. 11-20
	Uniform draft	1570-1565 1565-1560 260.8 kaf	Aug. 1-15 Aug. 16-31	31 days at < 1570 ft 16 days at < 1565 ft 1 day at 1560 ft	4,242 - Aug. 1-31
	Late draft	1570 1570-1565 1565-1560 260.8 kaf	Aug. 1-11 Aug. 12-21 Aug. 22-31	11 days at 1570 ft 20 days at < 1570 ft 10 days at < 1565 ft 1 day at 1560 ft	6,737 - Aug. 12-21 6,413 - Aug. 22-31
Refill of Banks Lake		1560-1565 1565-1569 1569-1570	Sep. 1-10 Sep. 11-18 Sep. 19-22	18 days < No Action elevation; 22 days to reach 1570 ft	6,705 - Sep. 1-18 2,697 – Sep. 19-22

kaf — thousand acre-feet

Alternatives Considered but Eliminated

Several action alternatives were considered but were eliminated from further consideration because they limited Reclamation's flexibility to provide increased water when needed most for the outmigration of the salmon. Specifically, August water flow levels in the Columbia River may be different each year for various reasons, including precipitation and operation of the CBP. Alternatives that would dictate specific lake water surface elevations during specific August dates would unduly restrict Reclamation's ability to increase flows when the fishery managers felt the salmon most needed the flows. Therefore, these alternatives were eliminated from further consideration. They were, however, carried forward as scenarios in the Action Alternative to illustrate the potential range of impacts associated with different ways of achieving the drawdown to 1560 feet in water surface elevation.

Reclamation also evaluated an action alternative that included a different refill period. Refilling to elevation 1565 by September 10 would require pumping during heavy load hours, as well as light load hours. Pumping costs are greater during heavy load hours. BPA requested that refill be delayed so that pumping could be done during light load hours only. The longer refill period, which would reduce the overall costs of power for the refill by about $890,000, would extend from September 1 through October 14. The analysis included:

- Shallow aquatic macrophyte species such as reed canarygrass, Baltic rush, cattails and sedges that are drought tolerant would survive the drawdown and would continue to be available as critical nursery habitat for many species of juvenile fish. Several other less drought tolerant species such as American bulrush and softstem bulrush, would likely be replaced by more tolerant species.

- At least nine species of fish would be adversely impacted by a prolonged drawdown, including yellow bullhead, largemouth bass, pumpkinseed, yellow perch, longnose, largescale, and bridgelip suckers, prickly sculpin, and northern pikeminnow. Juveniles of these species depend on the cover provided by aquatic macrophytes.

- Drawdown below the zone where these plant species occur would force juveniles into open water and subject them to increased predation. Many of these species serve as forage for popular game species, such as walleye and smallmouth bass, which may be adversely impacted due to reduced food availability.

- Benthic invertebrates production would be reduced in exposed areas, reducing food availability for many species of fish.

- Riparian trees and shrubs may also be adversely impacted. While mature black cottonwood trees should tolerate drawdown, seedlings may be adversely affected. Several willow species including peachleaf and coyote, are relatively drought intolerant and may be adversely impacted by drawdown. Other species such as Russian olive, an exotic, is drought tolerant and is likely to continue to spread along the shoreline.

- Recreation at Banks Lake is heavily based upon fishing with most visitors to the reservoir fishing at least part of the time and many of the visitors coming to the reservoir solely to fish. If the fishery were to decline it is anticipated that visitation to the reservoir would decline and that would affect those businesses around the reservoir that rely on the visitors for their major market. While this would most heavily affect the Coulee City area, the north end of Banks Lake also has significant segments of the economy tied to visitor use of the reservoir.

With this cascading series of impacts increasing over the Action Alternatives impacts, it was determined that the level of impact would be too great and an alternative encompassing a longer refill was dropped from further consideration.

Summary Comparison of Alternatives

A summary comparison of the environmental consequences of the alternatives is shown in table 2-2.

Table 2-2.—Summary comparison of the environmental consequences of the alternatives

Affected resource	No Action Alternative	Action Alternative
Vegetation, fish, and wildlife	Abundance and distribution continue to fluctuate with seasonal water levels, but overall stable.	Distribution and abundance impacted by more severe water level fluctuations.
Threatened and endangered species	Abundance and distribution continue to be limited by available habitat.	Fish prey may be more available to bald eagles. Although incrementally small, the 6 percent contribution adds to the total cumulative benefits of flow augmentation for salmon.
Recreation	7 of 12 boat launches are exposed and rendered unusable during the late recreation season (elevation 1565).	10 of 12 boat launches are exposed and rendered unusable at elevation 1562. Impacts to communities and businesses adjacent to the reservoir may be greater until users become accustomed to the greater fluctuation of the water surface. No launches on the southern half of Banks Lake would be usable. Steamboat Rock State Park (approx. 600,000 visitors annually) would not have a usable launch at elevation 1562.
Economics		
FCRPS[1]	FCRPS operates as it has historically.	As a result of the action, the difference in net energy generation results in a loss of 8,000 MWh annually.
GCPHA[2]	Power generation is not anticipated to change and will continue as it has historically.	Difference in net power generation losses range from 812 MWh to 1,695 MWh annually.
PUD[3] powerplants	Power generation is not anticipated to change and will continue as it has historically.	Difference in net power generation losses that would need to be replaced range from 6,248 MWh to 6,906 MWh annually.
Regional and local economy	Access to the water, number of recreation visits, recreation-related expenditures by the public, and the net benefits of recreation occur as they have in the past.	Surface water elevations below 1565 feet affect access and recreational use and, in turn, some recreation-oriented businesses. Lower water levels may curtail recreation visits, which would result in lower expenditures at a few recreation-related businesses near the lake. Overall, economic impacts on the economy of Grant County are negligible. The effect on net benefits of recreation within the county is indeterminate.
Irrigated agriculture	Full delivery of water to CBP[4] farmers.	Full delivery of water to CBP farmers.
Historic resources	Same as historically. Eighty-two historical properties appear to be affected from erosion.	Surveys would be conducted in the drawdown zone between elevations 1570 and 1560.
Traditional cultural properties	Same as historically. Nine TCPs would be affected; three are believed to be eligible to National Register.	It is probable that more TCPs lie in drawdown area below elevation 1565 feet.
Indian trust assets	Some areas can no longer support traditional uses; no additional impacts.	No additional impact.

Table 2-2.—Summary comparison of the environmental consequences of the alternatives, continued

Affected resource	No Action Alternative	Action Alternative
Environmental justice	No impacts were identified.	No impacts.
Surface water quality	Temperature and stratification will continue to change with changes in water elevation and meteorological conditions.	Mixing may shift 1 or 2 weeks earlier in the fall due to greater mixing and heating of the lake surface.
Groundwater quality	Concentrations of chemicals and groundwater levels will fluctuate with the elevation of Banks Lake.	Water level may change in the short term but will return to normal during refill. No change in existing concentration trends.
Native American sacred sites	No impacts were identified.	No impacts.
Visual quality	Approximately 1,300 acres of an unvegetated bathtub ring between elevations 1565 and 1570 feet.	Approximately 2,500 acres of an unvegetated bathtub ring between elevations 1570 and 1560 feet.
Air quality	No impacts.	No impacts.
Soils	Impacts by erosion would continue.	No additional impacts.
Social environment Public health	For some, as operation of Banks Lake will not change, values will not be affected. For others who value increased water for endangered salmon runs, their values will not be upheld. Lake drawdowns in late summer likely have negative impacts to mosquito production, resulting in lesser likelihood of mosquito borne disease, such as West Nile Virus.	The values of those who desire increased water for endangered salmon runs will be upheld. The values of those desiring higher lake levels would not be upheld. In the drawdown area, little or no shallow ponding areas were evident for mosquito use. Therefore, little likelihood of additional risk of mosquito borne disease, such as West Nile Virus.

[1] Federal Columbia River Power System
[2] Grand Coulee Project Hydroelectric Authority
[3] Public Utility District
[4] Columbia Basin Project

Chapter 3

Affected Environment

This chapter discusses the affected environment of the resources potentially affected by Reclamation's proposed action. These resources, in order of discussion, include vegetation, fish, wildlife, threatened, endangered, and special status species, recreation, economics, irrigated agriculture, historic resources, traditional cultural properties, Native American sacred sites, Indian trust assets, environmental justice, surface water quality, groundwater quality, visual quality, air quality, soils, social environment, and public health. Chapter 4 analyzes the environmental impacts of the Action Alternative to these resources, compared to the condition of the resources under the No Action Alternative.

Reclamation recently completed an environmental assessment (EA) and finding of no significant impact for the Banks Lake Resource Management Plan (RMP). The EA includes information on natural resources, such as endangered species, soils, vegetation, cultural resources, recreation use, and Indian trust assets. The information on these resources contained in the EA is incorporated by reference into this EIS.

Vegetation, Fish, and Wildlife

The littoral zone (shore) of Banks Lake extends from the shore just above the influence of waves and spray to a depth where the light is barely sufficient for rooted aquatic plants to grow (Goldman and Horne 1983). This biologically critical zone supports aquatic macrophytes (primarily cattails, bulrush, and sedges) that provide spawning habitat and nursery areas for the majority of Banks Lake's fish species; provides food and cover for waterfowl, mammals, and amphibians; and supports cottonwood trees important for perch sites for bald eagles and other raptors. This zone is the focus of analysis of impacts to vegetation, fish, and wildlife for the proposed August drawdown alternative.

Water levels not only determine the extent of littoral habitat, but affect that habitat when fluctuations occur (Hoyer and Canfield 1997; Ploskey 1986). Several recent studies on littoral zone habitats in lakes have documented decreases in total cover and changes in substrate composition with decreases in water level as small as 0.6 m (2 ft) (Irwin and Noble 1996). Beauchamp et al. (1992) estimated that 20 percent of rocky substrate, important as cover for small native fishes, was exposed during a drought that lowered Lake Tahoe's water level by 2 m (6.5 feet). Dibble (1993) found that bass populations were adversely affected by water level declines that dewatered shallow water gravel substrates that supported high densities of age-0 largemouth bass (less than 1 yr old).

The surface area and shape of a lake significantly influences the effect wind can have on wave size and current strength. Large lakes tend to have larger fetches (area open to the prevailing wind) and thus have greater wave and current energy than lakes with small surface areas. Wave action and currents erode a terrace along the shoreline, leaving coarse material in shallow water and depositing finer materials in deep water. The direction and strength of the wind, slope, and shape of the lake basin determine where the substrates will move. Generally, points and shallows where wind and wave energy are highest tend to be swept clean. Bays and deep areas in a lake tend to fill with sediment. The variation in the quantity and quality of silt largely controls the distribution of submersed vegetation. Large lakes with many bays or coves may develop an extensive littoral zone, because these areas are protected from strong waves and currents. Thus, basin size, shape, and depth determine, to a large degree, the distribution of sediments in a lake and, therefore, the distribution of aquatic plants. Additionally, a gently sloping littoral zone allows the deposition of fine sediments that promote plant growth. Steeply sloped littoral zones are areas of erosion and sediment transport and are not suitable for plant growth.

Three distinct littoral zone habitat types exist at Banks Lake. The first consists of shallow bays and shoreline areas sheltered from much of the wind and wave action with well developed communities of aquatic macrophyte species such as bulrushes, sedges, and cattails. The second and third types occur in the main lake exposed to wind and wave action. These consist of the extensive shoreline zone composed of sand, gravel, and cobble and the third type is composed of medium to hard-packed clay. Uplands are not affected by changes in water level and will not be addressed.

A vast body of scientific literature is available on the effects of reservoir drawdowns. This analysis draws upon the knowledge gained at many other reservoir projects to develop a better understanding of the present conditions and anticipated impacts resulting from an August drawdown. The analysis of impacts focuses on the littoral zone of the lake, as well as on the productivity of the open water in the form of zooplankton.

Vegetation

Two major vegetation communities that exist within the littoral zone may be affected by late summer drawdowns: (1) aquatic macrophytes in shallow low gradient bays and shorelines (figure 3-1); and (2) the narrow strip of riparian vegetation that exists just above the high-water line along some portions of Banks Lake. Aquatic macrophytes by definition are the macroscopic (that is large enough to be seen with

Figure 3-1.—Aquatic macrophytes are common in Banks Lake in coves, bays, and shorelines protected from wind and wave action.

the unaided eye) forms of aquatic and wetlands plants found in the shorelines of lakes or slow-moving reaches of rivers.

Four widely-recognized growth forms include emergent, submersed, floating-leaved, and free-floating. Emergent macrophytes are rooted in substrate with the tops of the plant extending into the air. Common emergent macrophytes include plants, such as reeds (*Phragmites*), bulrushes (*Scirpus* spp.); cattails (*Typha* spp.) and spikerushes (*Eleocharis* spp). Submersed macrophytes grow completely submersed under the water and include such diverse species as pondweeds (*Potamogeton* spp) and Eurasian watermilfoil. Floating-leaved macrophytes are rooted to the lake bottom with leaves that float on the surface of the water. They generally occur in areas of a lake that do not periodically dry out. Typical species are waterlilies (*Nymphaea* spp), spatterdock (*Nuphar* spp), and watershield (*Brasenia*). Free-floating macrophytes are plants that float on or just under the water surface with their roots in the water and not in sediment. Duckweed (*Lemna* spp.) typifies this growth form.

In the semi-arid and arid portions of the West, water availability to plants from rain and snowmelt infiltration is limited, sporadic, and unreliable. Riparian and emergent vegetation has adapted to these harsh conditions by drawing much of their seasonal water needs from comparatively reliable groundwater sources (Stromberg 1994; Mahoney and Rood 1991). Any significant change in groundwater elevation during the growing season has the potential to adversely affect these vegetation communities (Stromberg 1992). Mortality or even stress in these species will lead to changes in vegetation community composition.

Many species of riparian vegetation, especially cottonwood, have very specific soil moisture requirements needed for germination and seedling survival. These requirements typically involve early spring high water levels that recede just prior to seed fall, providing a moist seedbed. Any significant alteration of the timing or magnitude of water levels can adversely affect germination and seedling survival (Bradley and Smith 1986; Stromberg 1992) and can have long term effects on these species.

Aquatic Macrophytes

Banks Lake full pool is water surface elevation 1570 feet. Water levels currently fluctuate approximately 3 to 5 feet annually with the highest water levels typically in June and the lowest levels in August. This relatively stable water regime has allowed the development of aquatic macrophytes in all available protected bays and shorelines. Shallow, marshy areas in bays and along low gradient shorelines occur in only a few areas, but are extremely important to fish and wildlife (figure 3-1). Aquatic macrophytes provide sheltered nutrient-rich spawning and nursery habitat for many of Banks Lake fish species as well as waterfowl nesting and foraging. This habitat type is found primarily in Barker Cove, Osborn Bay, Kruks Bay, Jones Bay, Airport Bay, and Devil's Punch Bowl, and along shorelines in the southwest corner of Banks Lake adjacent to the Dry Falls Dam (figures 3-2 and 3-3).

Stands of aquatic macrophytes occur in shallow (<6.5 feet (2-m) depth), protected bays and shorelines with a gentle slope. A fine-textured substrate is preferred and generally indicates a favorable, low-energy environment. Dominant species include reed canarygrass (*Phalaris arundinare*), and Baltic rush (*Juncus balticus*). Lesser amounts of American bulrush (*Scirpus americanus*), Nebraska sedge (*Carex nebrascensis*), spike rush (*Eleocharius palustrius*), common cattail (*Typha angustifolia*), curly dock, foxtail barley, buttercup, western water hemloc, cocklebur, horsetail, inland saltgrass, noxious knapweeds, marsh sow thistle, and red top bentgrass (*Argostis alba*) also occur in these stands of aquatic macrophytes.

Unfavorable abiotic conditions include excessive water-level fluctuations, high turbidities, and shifting sediments. Small, young plants are especially vulnerable to changing water levels that may place them in water too deep or muddy to allow for adequate light penetration or so shallow as to expose them to turbulence or desiccation or cover them with sediment (Smart and Dick 1999). The ability to tolerate periodic drawdown and drying will determine which aquatic macrophyte species would be able to survive. Fourteen representative aquatic macrophyte species that occur or potentially occur at Banks Lake have been selected for detailed analysis. Table 3-1 summarizes the drought tolerance and the species value for fish and wildlife for these species.

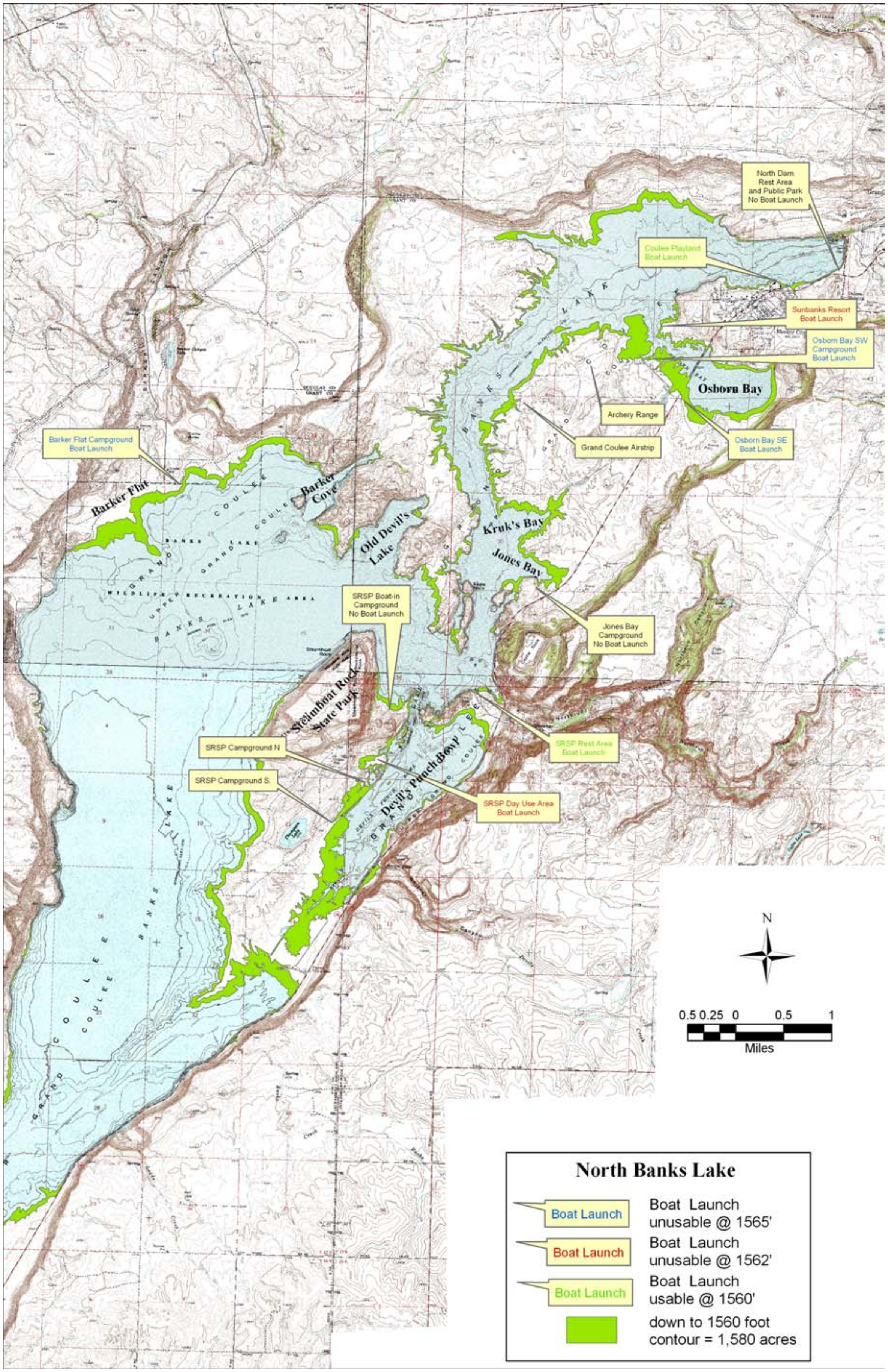


Figure 3-2. North Banks Lake.

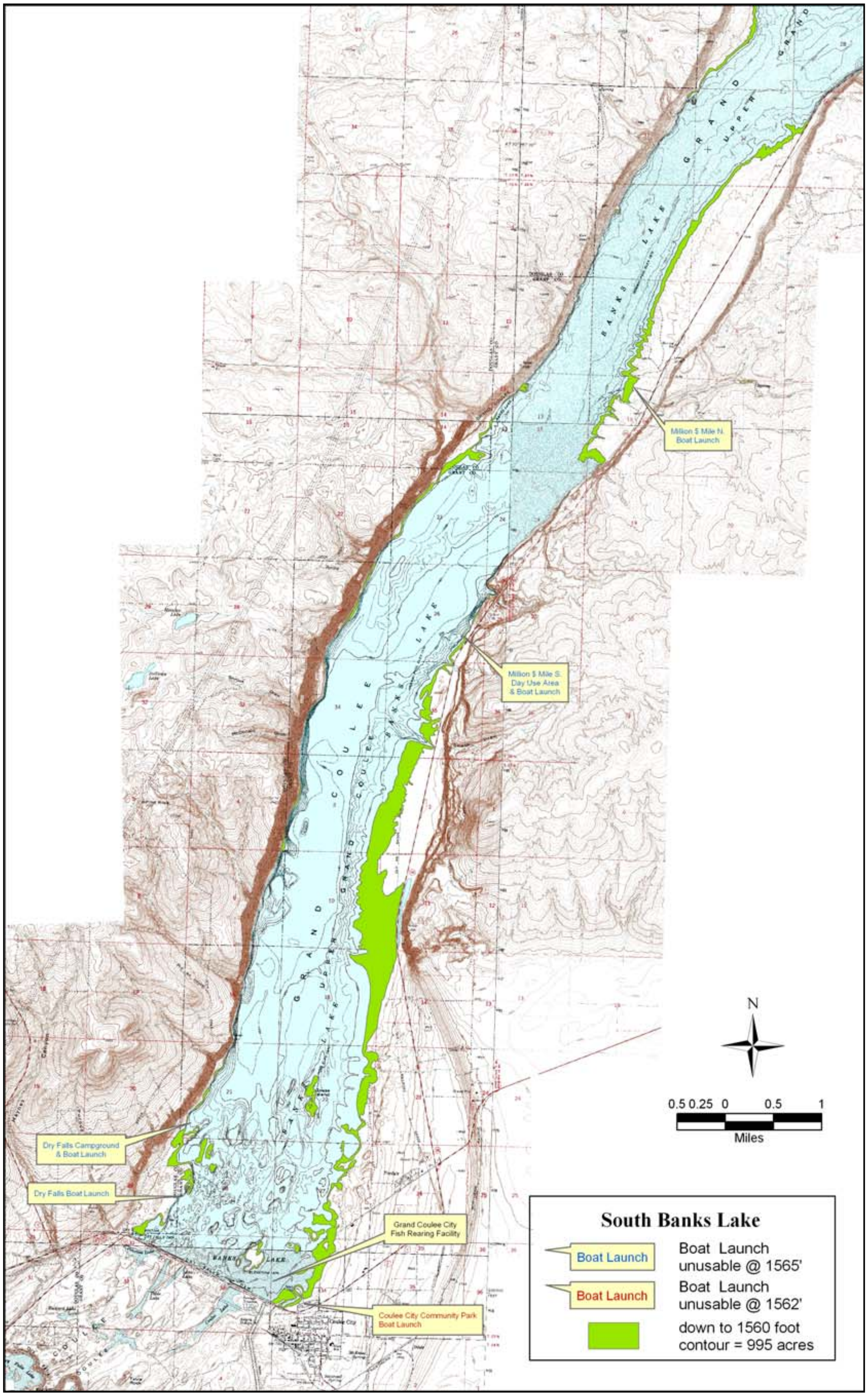


Figure 3-3. South Banks Lake.

Table 3-1.—Drawdown tolerance for aquatic macrophytes species characteristic of the habitat at Banks Lake

Species	Drought Tolerance	Fish/Wildlife Value
Nebraska sedge	Drought tolerant. Prefers soils saturated early in the season that later dry out.	Good food for waterfowl, cover for waterfowl and small mammals.
Beaked sedge	Drought tolerant. Tolerates extreme water level fluctuation, but shoot size can be affected.	Provides food for waterfowl and small birds.
Hardstem bulrush	Fairly drought tolerant. Often associated with common cattail. Can persist through several years of dry conditions. Establishes well from seed stored in the seedbank. May be replaced by cattail in continuously flooded marshes following drawdown.	Fair food for small mammals, songbirds, and upland gamebirds. Provides good cover for birds, small mammals, and waterfowl. It buffers wind and wave action that can enhance vegetation establishment along shorelines.
Baltic rush	Drought tolerant. Tolerates dry conditions, as well as a wide range of hydrologic conditions.	Important nesting, hiding, and feeding cover for shorebirds, songbirds, waterfowl, and small mammals.
Common spikerush	Drought tolerant. Thrives in shallow wetlands that are flooded by spring runoff, and then slowly dry up during summer. Seeds are always present in the seedbank and can germinate in standing water.	High protein content makes it an important food for waterfowl. Provides cover for waterfowl, small birds, and small mammals.
Common cattail	Drought tolerant. Tolerant of continuous inundation and seasonal drawdowns.	Poor waterfowl nesting habitat when dense. However, it provides good nesting cover for various small bird species.
Narrow-leaved cattail	Similar to the more robust common cattail.	Similar to the common cattail.
Eurasian water milfoil	Drought tolerant. Obligate wetland species; however, drawdowns must occur during periods of freezing temperatures to kill it.	Little value to wildlife or fish.
Reed canarygrass	Drought tolerant. Tolerant of frequent and prolonged flooding and submergence.	Waterfowl, upland game birds, riparian mammals, and fish use it for cover and food.
American bulrush	Drought intolerant. Best survival and growth occurs where average minimum yearly water levels do not fall below 2 to 4 inches above the soil surface.	Important food for waterfowl and small mammals.
Softstem bulrush	Drought intolerant. Establishes from the seedbank following periodic draining and reflooding though prolonged draining and reflooding can reduce or eliminate stands.	Provides good food and cover for waterfowl.
Redtop bentgrass	Drought intolerant. It is found in wet, poorly drained conditions in shallow shoreline fringes and terraces adjacent to shoreline.	Provides good food and cover for waterfowl and upland gamebirds.
Lesser duckweed	Drought intolerant. Obligate wetland species.	High value for waterfowl and shorebird food.
Sago pondweed	Drought intolerant. Obligate wetland species.	Very high value for waterfowl and shorebird food.
Source: Natural Resources Conservation Service 2000; Forest Service, 2000; Hitchcock and Cronquist 1973; Bentrup and Hoag, 1998; Reclamation, 2001.		

Riparian Vegetation

The riparian vegetation along the shoreline of Banks Lake is dominated by black cottonwood (*Populus balsamifera*), Russian olive (*Elaengnus augustifolia*), willow (*Salix* spp.), and Wood's rose (*Rosa woodsii*), with lesser amounts of red-osier dogwood (*Cornus sericea*). Shoreline erosion is degrading many shoreline riparian areas or is preventing their establishment and development. In some areas, persistent erosion is undercutting the banks and roots of mature riparian cottonwood and willow trees, causing them to fall over (figure 3-4). Land use activities such as livestock grazing, dispersed recreation, and motor vehicle travel have accentuated the erosion problem and contribute to the lack of riparian vegetation and ground cover in many shoreline areas.

There are more than 30 willow species in Washington (Wash. Dept. Transportation 2001); however the willow species present along the littoral zone at Banks Lake have not been keyed to species to our knowledge. Two representative willow species characteristic of the Eastside (Interior) riparian-wetlands of Washington were chosen to analyze the overall drought tolerance and value to wildlife. The peachleaf willow (*Salix amygdaloides*) is a common species of the riparian areas in the sagebrush-steppe habitat type (IBIS 2000). Coyote or sandbar willow (*Salix exigua*) is also a common species in the eastern Washington shrub-steppe zone, but has a wider drought tolerance that ranges from low to medium. Black cottonwood, Russian olive, red-osier dogwood, and Wood's rose were also selected for detailed analysis of impacts to littoral zone riparian vegetation from an August drawdown. The analysis focused on changes in groundwater levels that may affect plant vigor and

Figure 3-4.—Eroding banks threaten a mature cottonwood near the Million Dollar Mile South Boat Ramp.

growth. The drought tolerance of several riparian species that occur at Banks Lake is summarized in table 3-2. The value for wildlife is also summarized.

Table 3-2.—Drought tolerance of riparian species at Banks Lake

Species	Drought Tolerance	Wildlife Value
Black cottonwood	Tolerates some summer drought when established. Has shallow root system. Stores large quantities of water in trunk.	Important for cavity nesters, daytime perch for bald eagles. Leaves and young shoots browsed by deer and elk, and birds feed on buds, flowers, and seeds. Used by small mammals and birds for cover, roosting, and nest sites.
Russian olive	High drought tolerance. It is an exotic and is rapidly colonizing riparian areas.	Seeds eaten by a variety of birds and mammals. Provides nesting cover for many bird species.
Peachleaf willow (*S. amygdaloides*)	Low drought tolerance. Occurs on transitional riparian sites.	Provides cover for mammals and birds. It is a preferred food of beavers.
Coyote willow (*S. exiguna*)	Low to medium drought tolerance. It is an obligate wetland species. Occurs in the bank zone, overbank zone, and transitional zone in riparian areas.	Browsed heavily by elk. Dense stands provide cover for mammals and birds.
Red-osier dogwood	Medium drought tolerance.	Used as food and cover by mammals and birds.
Wood's rose	Low to high drought tolerance.	Food for many species of wildlife.
Source: Forest Service, 2000a; Forest Service, 2000b; Natural Resources Conservation Service, 2000.		

Fish

Banks Lake Fish Assemblage

Most of the fish species present in Banks Lake either were pumped in from FDR Lake on the Columbia River or were found in the small lakes of the upper Grand Coulee prior to inundation. Additionally, WDFW has planted several fish species, including but not limited to rainbow trout, kokanee, smallmouth bass, coho salmon, and chinook salmon. Creel surveys from the 1950s indicate kokanee salmon, burbot, bull trout, and possibly rainbow and eastern brook trout were pumped in with irrigation water from FDR Lake (Duff 1973). In the early 1950s, occasional bull trout were recorded, but with no available spawning habitat, the species never became established in the reservoir. Eastern brook trout also failed to establish a reproducing population and disappeared from catch and gill net survey data. With the exception of charr, brown trout, and rainbow trout, all of the other fish present in pre-reservoir lakes or drafted from FDR Lake were able to establish reproducing populations to various degrees. Currently, access to the outlet works for fish is limited by a barrier net that is installed and maintained by GCPHA.

Extreme drawdown during game fish spawning was a subject of concern during the recent Resource Management Planning (RMP) process. Several studies were conducted during the 1970s in Banks Lake to determine the effects of drawdown on the kokanee and yellow perch spawning, egg incubation, and fry emergence (Stober 1976 and Thomas 1978). The studies concluded that low recruitment of kokanee year classes exposed to drawdown was a factor in reducing their abundance. However, with the exception of maintenance drawdowns in recent years, drawdowns during the 1980s and 1990s have been less severe than they were during the 1960s and 1970s. Weed control drawdowns to control aquatic weeds, particularly Eurasian water milfoil, typically occur on a 10 to 15-year facility maintenance cycle. In the past, the lake level has been lowered about 20-25 feet during the winter season for facility maintenance.

Information on the status and management of Banks Lake fish species is provided in the Banks Lake RMP/EA incorporated by reference in this document, as well as in the Fish and Wildlife Coordination Act Report (CAR, see appendix A). Table 3-3 displays characteristics for Banks Lake fish species, including adult habitat, spawning substrate, spawning depth, spawning dates, spawning/reproductive characteristics, and food of young-of-year fish. These characteristics will be used to analyze the impact of drawdowns.

Spawning and Nursery Habitat

Shallow Aquatic Macrophytes.—The presence of aquatic macrophytes provides refuge for prey species and interferes with the feeding of some predator species. Exposure to predators strongly determines small fish feeding behavior. If they are relatively safe from predators, they can forage more effectively. For large predators, the visual barriers of plant stems decrease foraging efficiency; hence, growth declines as habitats become more complex (Colle and Shireman 1980).

Reproductive success of fish that spawn near the shore in reservoirs is influenced by the time and duration of flooding and the type of substrate inundated (Aggus 1979). Water levels determine the amount of nursery area available by inundating or receding from vegetation. Survival of young fish of many species is increased when cover is abundant. Lack of habitat exposes young-of-year fish to increased predation. The density of young-of-year largemouth bass (*M. salmoides*) in August in Bull Shoals Lake was directly related to acre-days of flooding of terrestrial vegetation (Aggus and Elliott 1975).

Small species of fish and juveniles of larger species occupy aquatic emergent vegetation (aquatic macrophytes) seeking food (Pardue 1973; Keast 1984) and predator protection (Crowder and Cooper 1982; Savino and Stein 1989). Differences in density and morphology of plants influence foraging intensity and degree of predator avoidance which, in turn, influence fish growth and survival (Dionne and Folt 1991; Lillie and Budd 1992; Dibble, Dick, and Killgore 1996). Foraging efficiency decreases in dense plant beds (Savino and Stein 1989; Anderson 1984). High-density plant beds provide greater protection from predators than

Table 3-3.—Characteristics of Banks Lake fish species

Family/ species	Adult habitat	Spawning: Substrate	Spawning: Depths	Spawning: Temper-ature	Spawning: Dates	Spawning: Reproductive characteristics	Food of young-of-year fish
GAME SPECIES – Ictaluridae – catfishes							
Channel catfish	Cool, clear, deeper water with sand, gravel, or rubble bottoms. Feeds in shallow water at night, returning to deep holes or cover during day	Holes, undercut banks, log jams, rocks	Relatively shallow	75 to 85 °F	Late spring or summer	Male builds nest and defends. Newly hatched fish have large yolks and remain on bottom 2-5 days, then swim to surface and begin to feed. Young fish remain in shallow water. Survival of young increases in turbid water	Diptera, also caddisflies and mayflies
Brown bullhead	Usually in deeper water along shoreline, but move into shallow, weedy areas to feed and spawn. Prefer shallow bays	Mud, sand or roots of aquatic vegetation near rocks, stumps, debris	As shallow as 6"	70 °F	April through June	Male or female builds shallow nest and cares for eggs. Newly hatched fish have large yolks and remain on bottom about 7 days, then begin to swim and feed actively. Young form a loose sphere and are shepherded about for several weeks by one or both parents until they are about 2", then disperse	Zooplankton and dipteran larvae initially, switching to midges, mayflies, worms, crustaceans, fish larvae, and eggs
Yellow bullhead	Shallow, clear-water parts of bays in areas of very heavy aquatic vegetation	Soft substrate near protection of stones or stumps	1-1/2 feet to 4 feet	70 °F	May and June	One or both sexes build nest in shallow depression. Males guard nest and brood young until dispersal at around 2". Can withstand more adverse conditions than brown bullheads, but removal of stumps, logs, or vegetation leads to decrease in numbers	Zooplankton and dipteran larvae initially, switching to midges, mayflies, worms, crustaceans, fish larvae and eggs
GAME SPECIES – Centrarchidae – sunfishes							
Largemouth bass	Shallow areas with rooted aquatic vegetation with brush, logs, or other cover	Sand, gravel, or rubble	1 to 4 feet	60 to 65 °F	Mid-May to end of June	Male builds and guards nest. Young remain in bottom of nest until yolk is absorbed (6 to 7 days), then rise to begin feeding and schooling. Can remain in a brood up to 31 days and are guarded by male. After dispersal from nest, small to medium individuals form small schools and cruise shorelines while feeding	Zooplankton and dipteran larva initially, then insects and fish
Smallmouth bass	Rocky reefs and gravel bars	Sand, gravel, rocks near logs, rocks, or vegetation	2' to 20'	61 to 65 °F	Late May to early July	Male builds and guards nest. After hatching, yolk sac is absorbed in 5-7 days and young rise off bottom of nest. Male guards young several days until dispersal	Zooplankton initially, switching to insects and fish
Black crappie	Dense aquatic vegetation over sand, muck, or organic debris. Feeds in weedy shallow areas < 10' in spring, then moves to deeper water during summer	Soft mud	< 8 feet	58 to 64 °F	May or early June	Males build and guard nest until fry leave. Young crappie are often found over open water of considerable depth (Pflieger). Their long planktivorous period and open water feeding reduce the degree of competition for food with other game species	Zooplankton and dipteran larvae
Bluegill	Warm shallow lakes with rooted vegetation. Adapted well to water fluctuations and absence of vegetation	Gravel, sand, or mud	2-1/2' feet	67 °F	May to early August	Male builds and guards nest. Male protects fry several days after hatching	Zooplankton initially, then aquatic insects, mollusks, crayfish, amphipods, and fish eggs
Pumpkin-seed	Clear quiet water with dense aquatic vegetation —usually denser than that preferred by bluegills	Gravel, sand, or mud	6"-12" near shore	68 °F	Late spring, early summer	Male builds and guards nest. Male protects fry up to 11 days, when young disperse. Small pumpkinseeds form part of the food of almost all predatory fishes, as well as the pumpkinseed and other sunfishes	Mayfly nymphs, zooplankton and midge larvae

GAME SPECIES – Percidae – perches							
Walleye	Returns to shallows of main lake in April after spring spawning migration. In summer, moves to deep, cooler water during the day, feeding in shallows at dusk. Holds in deep waters in winter	Rubble, gravel, bedrock, rocky shoals, or on sand or silt	Shallow water	38 to 44 °F	April	Eggs are broadcast and fall into crevices in rocky substrate. Yolk sac is absorbed rapidly, and feeding takes place prior to disappearance of yolk. Young disperse 10-15 days after hatching to upper levels of open water. By end of summer, young move toward the bottom in 10-30 feet of water	Zooplankton and fish. Highly cannibalistic if other food not available
Yellow perch	Seasonal movements follow the 68 °F isotherm. Very adaptable and able to use a wide variety of habitats	Sand, gravel, rubble, vegetation, and brush	Shallow water near shore	45 to 54 °F	April or May	No nest - eggs deposited in a ribbonlike, gelatinous mass near vegetation or submerged brush or over sand, gravel, or rubble. Young move from shallow water to deeper water in late fall. Young and adults are preyed on by almost all other predatory fishes and other yellow perch	Cladocerans, ostracods, and chironomid larvae
GAME SPECIES – Salmonidae – trouts, whitefishes							
Rainbow trout	In lakes, prefer temps < 70 °F. Move to deeper water if oxygen content is adequate	Unable to establish reproducing populations in Banks Lake	Fine gravel in a riffle	Extremely variable, depend-ing on stock	Feb. to June. Some stocks fall spawners	Spawning occurs in tributary streams	Aquatic insects, worms, fish eggs
Kokanee	In summer, in upper middle layers of open lake. Move to deeper water as water warms. Have extensive daily vertical and onshore-offshore movements	Formerly spawned along shorelines at Banks Lake, where groundwater percolated through gravel	Either in inlet stream or along shore-lines	Between 37.4 and 44.6 °F	Mid-October to mid-January	Wydowski and Whitney (1979) noted that Banks Lake had a large sustainable kokanee population. Since then, reservoir fertility has declined significantly, and juveniles can no longer survive	Zooplankton, particularly crustaceans, as well as bottom organisms
Lake whitefish	Prefers deep, cold lakes and is most abundant from 50 to 90 feet deep. In Banks Lake, fish also in shallows. Move to deeper water as temperatures warm in late spring	Rocky gravel or sand.	Shallow water < 25	46 °F	Oct. - Jan.	Larvae form aggregations along steep shorelines. Young generally leave the shallow inshore water by early summer and move into deeper water	Zooplankton initially; then, as young move into deeper water, feed on aquatic insect and midge larvae, as well as zooplankton
Mountain whitefish	Tends to frequent upper 15-20 feet	Gravel shoals along lake shorelines	5" to 4'	48 °F	Oct - Dec.	Eggs deposited in late Oct., hatch in early March. Newly hatched fry in shallows for a few weeks; at 1.2 to 1.6", fry move offshore	Plankton, midge larvae
NONGAME SPECIES – Cyprinidae – minnows							
Peamouth chub	Weedy shallows of lakes, where it tends to form schools	Stones and rubble at the shoreline edge	1" to 2"	54 °F	Late May to early June	Eggs are broadcast on gravel or rubble bottom along shoreline. Newly hatched young remain in schools along shore, moving into deeper water in late summer	Zooplankton
Northern pike-minnow	In spring and summer, adults in shallows. During fall and winter, move offshore into deeper water	Gravel beaches	Shallows	Probably similar to other cyprinids, like carp	Late May through July	No nest is constructed. Eggs are broadcast on gravelly beaches along shoreline. Young found in < 1 foot-deep water along rubble or gravel shores. In summer, moved into water about 3 feet deep with submerged vegetation	Small aquatic and terrestrial insects, becoming more piscivorous with increasing size
Carp	Quiet water in dense vegetation	Submerged weeds, grasses, roots	3" to < 4'	65 to 68 °F	Late spring - early summer	Yolk sac absorbed within a few days after hatching, and fry form large schools in shallow water. Young move into deeper water as they grow	Zooplankton initially, then add aquatic plants, insects, clams

NONGAME SPECIES - Catostomidae – suckers							
Long-nose sucker	Lake bottoms to 80 feet	Gravel	Shallow gravel areas	41 °F	Mid-April to mid-May	No nest is built. Eggs adhere to gravel and substrate. Young remain in gravel for 1-2 weeks before moving away from spawning area. Young remain in shallow, weedy areas. Young probably preyed on by wide variety of piscivorous fish and birds	Zooplankton, aquatic insect larvae and plants
Large-scale sucker	Backwaters and shallows of lakes on the bottom, but can be as deep as 80 feet	In lakes on gravelly or sandy shoals and shorelines	8"	46 to 48 °F	April or May	Fry remain in gravel or on surface of sand for first few weeks until yolk absorbed, then move to surface or mid-water and settle on the bottom by July. Growth is slow, fry < 1" by July. Fry move into shallow areas during the day and into deeper water at night. Fry may serve as forage for game fish species	Small zooplankton when at surface or midwater. After become bottom dwellers, diet shifts to aquatic insect larvae, diatoms, and plant material
Bridgelip sucker	Quiet areas in backwaters or edges of main current of rivers with sand or mud bottoms. Seldom found in lakes. Probably entrained into Banks Lake from Columbia River	Little is known about the biology of this species, but it is probably similar to other suckers	Shallow gravel areas	Probably similar to other suckers	Late May to June	Little is known about the biology of this species, but it is probably similar to other suckers	Probably similar to other suckers
NONGAME SPECIES – Cottidae – sculpins							
Prickly sculpin	Lakeshores over sand, gravel, or rubble. Small individuals in vegetated areas in shallow water. During winter, move to deeper water under cover of rocks, logs, and debris. Often in open, relying on cryptic coloring for concealment	Under rocks, logs, cans, car bodies, sheet metal	Relatively shallow	50 to 54 °F	Late February to late May	Larvae begin swimming immediately after hatching. Form schools and remain pelagic for 30 - 35 days before metamorphosing and settling on the bottom. A number of species prey on prickly sculpin including trout, whitefish, and mergansers	Zooplankton, aquatic insect larvae
Source: Scott and Crossman, 1973; Wydoski and Whitney, 1979; Simpson and Wallace 1982; and Pflieger 1997.							

medium- or low-density beds (Hayse and Wissing 1996). Studies have suggested that juvenile bluegills select higher vegetation densities to reduce predation (Savino and Stein 1982; Gotceitas and Colgan 1987; Hayse and Wissing 1996). Conversely, largemouth bass prefer to wait at the periphery of plant beds or in areas of lower plant densities.

Drawdowns can potentially affect fish in Banks Lake when water levels expose beds of aquatic macrophytes that provide cover from predation as well as substrate for food organisms.

Shallow Unvegetated Flats.—Two key shallow unvegetated flats identified by the Banks Lake RMP/EA include (1) the shallow flats just south of the Million Dollar Mile North Boat Ramp, where adjacent lake bottom is used by smallmouth bass; and (2) the flats east of Barker Flat, where the adjacent lake bottom is used by largemouth bass, sunfish (*Centrarchidae* spp.), and black crappie (*Pomoxis migromaculatus*) (figure 3-5). Other shallow flats that are also potentially important for adult and juvenile habitat include the extensive flats that occur between the Million

Figure 3-5.—Shallow unvegetated flats, like this one near Baker Flat, provide good habitat for many species of fish.

Dollar Mile North Boat Launch and the Million Dollar Mile South Boat Launch (figures 3-2 and 3-3) on the southwest side of Banks Lake.

Boulders, Cobble, and Gravel.—Boulders, cobble, and gravel are common substrates found predominantly along the steep western shoreline of Banks Lake, as well as in the shallow protected bays and unvegetated flats described above. This habitat provides spawning and rearing substrate for a number of fish species, including largemouth bass, smallmouth bass, walleye, and prickly sculpin. Additionally, the young of many of Banks Lake's fish species move offshore in summer after rearing for a number of weeks along the shallow vegetated littoral zone. Boulders and cobbles provide refugia from predators and substrate for benthic invertebrates (figure 3-6).

Susceptibility of Juvenile Fish to Predation.—The above discussion of spawning and nursery habitat points out the importance of aquatic macrophytes in providing cover from predators for many species of juvenile fish, particularly during the early larval stages. Boulders, cobble, and other debris, as well as turbid water, also provide cover for juvenile fishes. Juveniles of the following species rely on aquatic macrophytes in shallow areas for predator protection throughout the year: yellow bullhead, largemouth bass, pumpkinseed, yellow perch, longnose sucker, largescale sucker, bridgelip sucker, prickly sucker, and northern pikeminnow. Water level

Figure 3-6.—Much of the shoreline along Banks Lake consists of sand, gravel, cobble, and boulders. These are generally exposed to wind and wave action.

drops that force juveniles out of the stands of aquatic macrophytes into open water without cover are likely to result in increased predation on those species. Juveniles of other fish species; however, move into deeper water during late summer and no longer depend on the cover afforded by aquatic macrophytes and thus would be affected by a drawdown to elevation 1560 feet. These species include brown bullhead, smallmouth bass, black crappie, walleye, lake whitefish, mountain whitefish, peamouth chub, and common carp. Channel catfish juveniles rely on shallow, but unvegetated areas.

Aquatic Food Base

Zooplankton.—Banks Lake is the forebay for pumped-storage power generation and is dominated by a seasonal flowthrough of irrigation water from north to south. The flowthrough creates two distinct pools, with the north pool having colder water temperatures, reduced stratification and transparency, and higher plant nutrient levels than the south pool. Zooplankton biomass and composition are significantly different in the two pools, with the south pool having a higher biomass. The zooplankton biomass of the north pool is composed of roughly equal portions of *Bosmina, Cyclops, Nauplii, Daphnia*, and *Diaptomus*. The south pool zooplankton community is dominated by *Daphnia,* with the percentage of *Bosmina* gradually dwindling to insignificant levels at the south end of the lake (Knutzen 1977).

Benthic Invertebrates.—Aquatic plants and attached organisms, such as algae, protozoans, and bacteria (periphyton), as well as detritus, provide food and habitat for a wide variety of organisms. High invertebrate densities are typically associated with aquatic plants (Hoyer et al. 1997). Very few invertebrates or fish feed directly on the large aquatic plants; instead, they feed on the attached organisms and detritus (Heckey and Hesslein 1995).

Benthic invertebrates that live in sediments also collect beneath macrophytes. Some use plant remains as food and shelter. Others eat algae that covers sediments. In the Eau galle Reservoir in Wisconsin, benthic invertebrates were more than tenfold greater in number in a coontail (*Ceratophyllum demersum*) bed than in an adjacent barren area with the same substrate (Miller et al. 1989). The inshore area under macrophyte beds in Halverson Lake, Wisconsin, contained 60 percent of the midge larvae and over 90 percent each of snails, fingernail clams, caddisfly, dragonfly, damselfly, and mayfly larvae (Engel 1985) in the lake.

Invertebrates are a major food source for forage fish and young life stages of many game fish. Young waterfowl depend heavily on invertebrates as a high-protein food source needed for rapid early growth (Hoyer and Canfield 1997).

Fish Nets at Dry Falls Dam

A requirement to install and maintain nets to reduce the loss of fish from Banks Lake into the Main Canal was placed on the Grand Coulee Project Hydroelectric Authority (GCPHA) during the licensing process for Dry Falls Powerplant. The GCPHA has had the nets installed since receiving their license to operate the Dry Falls Powerplant. The nets are suspended from floats between the Coulee City Park breakwater and an island and between the island and Dry Falls Dam. The nets are sized to reach the bottom of the lake when the reservoir is at full pool elevation of 1570 feet.

Wildlife

Aquatic macrophytes and riparian vegetation are important. Aquatic emergent vegetation and submerged plants (collectively referred to as aquatic macrophytes) are widely consumed by wildlife (Hoyer and Canfield 1997). Pelikan et al. (1971) reported that 90 percent of the net annual cattail production is consumed or used as lodge construction by muskrats. Smith and Kadlec (1985) reported that waterfowl and mammalian grazers reduced cattail production by 48 percent in the Great Salt Lake marsh. Muskrat grazing is important for maintaining diversity in the emergent zone. Open areas in the cattail marsh are produced that increase edge effect and allow submersed species and other emergent species to invade areas previously occupied by a single species of dense emergent vegetation.

Seeds, tubers, and foliage of submersed species are used as food by a variety of wildlife, especially waterfowl (Nichols and Vennie 1991). Plant material is often high in carbohydrates, which provide energy for long migratory flights. Invertebrates produced in aquatic macrophyte beds are also important to wildlife production. They produce the protein that is vital to laying hens and chicks of many waterfowl and related waterbirds. Predators, such as eagles, osprey, loons (*Gavia* spp.), mergansers, cormorants, mink, otter, raccoons, and herons, feed on fish which, in turn, feed on invertebrates that lived in aquatic plant beds (Hoyer and Canfield 1997).

Nesting sites in, or nesting materials from, the emergent zone are important to species like red-winged and yellow headed blackbirds, marsh wrens, western grebes (*Aechmophorus occidentalis*), bitterns, Canada geese, and muskrats. At times, geese and other waterfowl nest on top of muskrat houses or muskrat food piles made of cattails (Hoyer and Canfield 1997).

Riparian areas are estimated to provide less than 1 percent of the land base in the Pacific Northwest, yet support the greatest diversity and abundance of wildlife that exist in the regions (Service, 1990). The WDFW reports that 90 percent of Washington's terrestrial vertebrate species use riparian areas for some part of their life cycle (Service, 1998). The high wildlife value of these areas is derived from the structural complexity of vegetation, connectivity with other ecosystems, a high edge-to-area ratio, abundant food and water, and a moist and mild microclimate.

Riparian habitats in Washington have been identified as priority areas for monitoring, research, and management of neotropical migrant birds (Andelman and Stock, 1994). Extensive woody riparian areas comprised of black cottonwood and willows exist around Osborn Bay. These areas provide habitat for game and nongame birds, furbearers, and other mammals. Since Banks Lake was inundated in 1951, willow and cottonwood riparian areas have developed along the margin of Banks Lake.

Information on the status and management of Banks Lake wildlife species is provided in the RMP/EA incorporated by reference in this document, as well as in the Fish and Wildlife Coordination Act Report (see appendix A). Table 3-4 summarizes wildlife species groups present in the Banks Lake littoral zone and on the surface of the lake.

Table 3-4.—Wildlife of the Banks Lake littoral zone and lake surface

Group	Characteristics
Raptors	11 species observed during 8 Service surveys conducted in 1998. Species present include bald eagles, red-tailed hawks, northern harriers, golden eagles (*Aquila chrysaetos*), prairie falcons, peregrine falcons (*Falco peregrinus*), long-eared owls, short-eared owls, and Cooper's hawks. High diversity of raptor species due to abundance of suitable raptor nesting habitat in basalt cliffs and shoreline trees.
Neotropical migrant songbirds	66 species documented at Banks Lake. Neotropical migrant songbirds have experienced widespread habitat destruction and population declines (Andelman and Stock, 1994).
Waterfowl	22 species observed by the Service. Average winter count of 4,600 ducks, geese, and swans, ranging from a high of 20,000 birds to 0 when the reservoir was completely ice covered. Southeast shoreline provides habitat for several thousand mallards and northern pintails and several hundred Canada geese during fall migration. Most breeding occurs below Dry Falls Dam, in the Devil's Punch Bowl, and in Osborn Bay. More scattered use occurs in smaller bays and inlets in the main lake and adjacent wetlands (Service, 2000).
Colonial nesting birds	5 species have been documented in the three islands in the south end of Banks Lake: great blue heron, black-crowned night heron, California gulls, ring-billed gulls, and Caspian terns. Western grebes have been observed nesting in Osborn Bay and Devil's Punch Bowl and in smaller numbers elsewhere in cattails and bulrushes in the littoral zone. American white pelicans are documented using the south end of Banks Lake during spring and fall migrations (Service 2000).
Mammals	47 species have been documented or potentially occur at Banks Lake. Mule deer, coyotes, Nuttall's cottontail, and porcupine are common. Black bear and mountain lion are thought to be transients through the area.
Amphibians and reptiles	11 species have been documented at Banks Lake. The racer was the most common species followed by the western rattlesnake. The long-toed salamander may potentially have larvae in the water during the August drawdown period. Great Basin spadefoot, western toad, and Pacific tree frogs occupy a wide variety of habitats in eastern Washington and may potentially occur in Banks Lake. Bull frogs are present. This exotic species has adversely affected native amphibians and may have adversely affected natives at Banks Lake as well.

Threatened, Endangered, and Special Status Species

As mentioned in chapter 1, *Purpose of and Need for Action*, the NMFS BiOp for the operation of the FCRPS, provided Reclamation with Reasonable and Prudent Alternative (RPA), Action 31. Action 31 recommends that Reclamation assess the environmental effects of operating Banks Lake August surface elevations to minimum elevation 1560 feet, so that additional Columbia River water may be available for migration flows for juvenile salmonids listed under ESA.

This EIS and its Action Alternative are intended to meet the intent of Action 31. The Final EIS and the Record of Decision will document the completion of RPA Action 31. Reclamation need not further consult with NMFS regarding the proposed project.

Banks Lake drawdown is one of several RPA actions recommended by NMFS to improve flows for ESA listed juvenile anadromous migrating fish. In addition to providing physical barriers for fish migration, dams also create reservoirs, which widen the river and decrease riverflows. Decreased riverflows result in increased salmon travel time, greater predator exposure, and other mortality factors. Such flow reduction is particularly harmful to anadromous fry, which have a reduced swimming ability. Fry are greatly dependent upon riverflows to assist their journey to the estuarine environment. Park (1969) observed that after completion of dams in the upper Columbia River, downstream migration of chinook salmon fry extended through August, where previously the migration was completed by July (Mains and Smith 1964). Therefore, another impact of dams on anadromous salmon is the shift in rearing from the estuary to reservoirs and extended residence in mainstem rivers (Northwest Fisheries Science Center 2000). The FCRPS Biological Opinion (NMFS 2000) is incorporated by reference into this EIS.

As part of the informal consultation process, Reclamation requested the Service to provide a list of federally listed or proposed species that may occur in the area of Banks Lake. In a letter dated May 30, 2001, the Service provided Reclamation with the federally listed and proposed species, as well as candidates for Federal listing, in the Banks Lake area. Although no federally listed endangered species were included in the May 30, 2001, Service letter, the Service announced an emergency listing of the Columbia Basin distinct population segment of the pygmy rabbit (*Brachylagus idahoensis*) as endangered, on November 30, 2001 (Federal Register 2001). The bald eagle *(Haliaeetus leucocephalus*) and the Ute ladies'-tresses (*Spiranthes diluvialis*), both federally listed as threatened species, were included in the Service letter. No proposed-to-be-listed species were provided. The Western sage grouse (*Centrocercus urophasianus)* and the Washington ground squirrel (*Spermophilus washingtoni*) were included by the Service as candidate species for Federal listing. Although candidate species are not afforded the same protection as listed species under ESA, they are evaluated in this EIS. The following discussion on threatened and endangered species, as well as the threatened and endangered species discussion included in chapter 4 of this EIS, provides Reclamation's Biological Assessment, as required under 50 Code of Federal Regulations (CFR) 402.

The following text provides a brief description of the status and distribution; life history and ecology; and the reasons for decline of the species described above.

Snake River Fall Chinook Salmon

A detailed analysis of this species is included in the Biological Opinion for the operation of the Federal Columbia River Power System (NMFS 2001). The Biological Opinion is incorporated by reference into this EIS. This EIS focuses specifically on potential impacts of an August drawdown to those special status species that exist, or potentially exist, at Banks Lake.

Pygmy Rabbit

Status and Distribution.—Within Washington, the range of the pygmy rabbit (*Brachylagus idahoensis*) has been reduced to five isolated fragments of sagebrush-dominated habitat within Douglas County. The pygmy rabbit is listed as a State endangered species. On November 30, 2001, the Service announced an emergency listing of the Columbia Basin distinct population segment of the pygmy rabbit species as endangered (Federal Register 2001). Surveys conducted by the Service were unable to find any pygmy rabbits within the Banks Lake area (Service 2002); however, the Service recommends that additional surveys be conducted before any future activities are allowed which could adversely affect the sagebrush-steppe community.

Life History and Ecology.—This is the smallest North American rabbit species and is one of only two rabbit species in North America that dig their own burrows in deep, loose soil. They are dependent on tall, dense sagebrush for food and shelter.

Reasons for Decline.—WDFW (1995) indicates that most of the original pygmy rabbit habitat in Washington has been degraded to the point that it cannot support this species. Additional losses may occur through conversion of the shrub-steppe to cropland or grazing land for cattle or through wildfire.

Bald Eagle

Status and Distribution.—The bald eagle (*Haliaeetus leucocephalus*) is a Federal and State listed threatened species. They were the most common raptor observed during surveys conducted by the U.S. Fish and Wildlife Service at Banks Lake (Service 2000). Eagles were found around the entire shoreline of Banks Lake, perched in large trees—usually black cottonwood or ponderosa pine. They were also observed on rocky islands and outcrops near shore and on rock outcrops up to 0.5 mile from shoreline, often high on cliff faces, as well as on ice during winter (Service 2000). Most of the large trees along the shoreline were used by eagles at some time during the winter. About a dozen specific trees nearly always contained one to ten individuals. The high count in 1998 was 126 eagles, with an average count of 63 birds for that year. The high count in 1999 was 63 eagles, with an average count of 46 birds. Northrup Canyon probably contains the largest bald eagle communal roost in eastern Washington (Service 2000).

Bald eagles have nested on the north side of Steamboat Rock for several years. One chick was found in the nest on June 2, 1998, but no nesting activity was observed there during 1999. A new nest was discovered near Osborn Bay in 1998, with at least one eaglet successfully fledging from that nest. The Steamboat Rock nesting pair became established and successfully nested adjacent to intense recreational activities in the State park. A popular boat-in campground is located just east of the nesting site. The impact of human disturbance is expected to increase as nearby recreation activities and public awareness of nesting eagles rise (Reclamation, 2001b).

Bald eagles are known to roost in Russian olives present in the riparian zone at Banks Lake. Mature cottonwoods and willow trees are also used. Many of the mature cottonwoods and willows are at risk from shoreline erosion.

The Steamboat Rock Bald Eagle Nest Territory Management Plan was developed to manage and protect the nest site at Steamboat Rock. That plan, however, does not address the recent expansion of the nesting territory into Osborn Bay.

Life History and Ecology.—The abundance and availability of prey is probably the most important factor determining the presence and density of eagle territories. Reservoirs and introduced fishes and concentration areas for wintering waterfowl may mitigate, to some extent, the impact that salmon declines may have had on eagles. Eagles may be able to nest or winter at locations that historically did not have sufficient prey to support them. There are 4,051 lakes and reservoirs in eastern Washington. Of the 76 fish species in Washington's inland waters, 30 are introduced (Wydoski and Whitney 1979). Stinson et al. (2001) speculate that some introduced fish species are more available to eagles during the late nesting period than are live salmon. Introduced fish species eaten by bald eagles that also occur at Banks Lake include black crappie, walleye, smallmouth bass, brown bullhead, lake whitefish, channel catfish, yellow perch, largemouth bass, and sunfishes (Stinson et al. 2001).

Nesting bald eagles feed predominantly on fish and waterfowl, which are usually associated with large, open expanses of water (Stalmaster 1987). They forage mostly close to shoreline perch trees (less than water surface elevation 1640 feet), and areas of shallow water may be preferred, because the limited depth brings fish closer to the surface (Buehler 2000).

Reasons for Decline.—One of the most significant problems for Washington's bald eagles is the continued loss of mature and old growth Douglas fir forest used for nesting habitat in the lowlands around Puget Sound, due to urbanization. Most eagles are sensitive to disturbance during nesting (Stinson et al. 2001). Salmon declines in the Columbia River may have adversely affected populations in Washington.

Ute Ladies'-Tresses

Status and Distribution.—Ute ladies'-tresses (*Spiranthes diluvialis*), a perennial orchid, was federally listed as threatened in 1992. It is also a State threatened species. Its presence was confirmed in southeastern Idaho in 1996 along the upper Snake River and in northern Washington in 1997. A population is also known to occur in Okanogan County, Washington (NMFS 1999). Prior to this, it was known only from a few locations in Montana, Colorado, Wyoming, and Nebraska.

This is a wetland and riparian species found in springs, wet meadows, river meanders, and flood plains from elevations 1500 to 7000 feet (Service 1998). Banks Lake habitats where *S. diluvialis* may occur include wet meadows fed by freshwater springs; riparian forest, riparian shrub, and wet meadow mosaics; wet areas in open shrub or grassland; wetlands created in gravel or borrow pits; and habitats dominated by grasses, rushes, and sedges.

Life History and Ecology.—Ute ladies'-tresses inhabit full sun to partial shade in early to mid-seral communities subject to flooding or periodic inundation. Beaked spikerush *(Eleocharis rostellata)* appears to be the dominant species in habitat occupied by Ute ladies'-tresses and is a good indicator throughout its range. Other species commonly associated with the orchid include creeping bentgrass *(Agrostis stolonifera)*, Baltic rush, long-styled rush, and scouring rush *(Equisetum laevigatus)*. Other common associates include rushes *(Juncus* spp.*)*, paint-brushes *(Castilleja* spp.*)*, thinleaf alder saplings *(Alnus incana)*, narrowleaf cottonwood saplings *(Populus angustifolia)*, sweetclover *(Melilotus* spp.*)*, willow saplings *(Salix* spp.*)*, sedges *(Carex* spp.*)*, red clover *(Trifolium praetense)*, and western goldenrod *(Solidago* spp.*)*.

The Service conducted Ute-ladies'-tresses surveys in late August 1999 during the peak blooming period when this species is most conspicuous. The Service found no Ute ladies-tresses and little potential habitat within the Banks Lake area (Service letter dated August 31, 1999). The Service concluded that the Banks Lake shoreline is either too steep and rocky, too dry, or inundated for too long during the growing season to provide suitable habitat for this species. The Service did, however, identify two perennial streams along the northwest shoreline and Bebe Springs as potentially suitable habitat, and recommended that additional surveys be conducted at these sites. Plants bloom in late summer. However, complicating surveys is the fact that this species can remain dormant for several growing seasons or produce only vegetative shoots.

Reasons for Decline.—Urbanization, stream channelization, water diversions, watershed degradation, conversion of riparian and flood plain to agricultural uses, and decline of pollinators have all contributed to the decline of this species (WDNR 2001). This species also appears to have a very low reproductive rate and does not compete well with aggressive species, such as reed canarygrass or purple loosestrife.

Western Sage Grouse

Status and Distribution.—Western sage grouse is a candidate for Federal listing and a State threatened species. There are two populations in Washington with a total of about 1,000 birds. They occur 34 miles apart in Douglas County and parts of Kittitas and Yakima Counties. Both populations exhibit relatively low numbers of males at leks making them vulnerable to predation, inclement weather, fire, and increased grazing pressure. Small reductions in habitat quality may have significant effects on the continued use of leks. It has not been documented within the Banks Lake study area, but it has been found in sagebrush habitat adjacent to Barker Canyon (Reclamation, 2001).

Life History and Ecology.—Western sage grouse nesting habitat was characterized by Sveum et al. (1998), who found that most of the nests (71 percent) were in big sagebrush *(Artemesia tridentata Nutt.*)/bunchgrass communities.

Successful nests had less shrub cover (51 percent) and shrub height 25 inches (64 cm) than nests that were depredated (70 percent and 35 inches (90 cm), respectively). During summer in Washington, sage grouse were observed moving from sagebrush to wet areas with annual forbs in fallow fields. Sage grouse on the Yakima Training Center did not frequent springs, major streams, and associated riparian areas for water and food (Cadwell et al. 1994). However, in Oregon, they were observed feeding on forbs near playas, waterholes, and meadows in summer (Willis et al. 1993).

Reasons for Decline.—Primary threats to remaining sage grouse populations include the potential reduction of lands in the Conservation Reserve Program and the potential for large-scale fires that eliminate large stands of sagebrush. Protection of remnant patches of native habitat is the most critical need for sage grouse (Hays et al. 1998).

Washington Ground Squirrel

Status and Distribution.—The Washington ground squirrel (*Spermophilus washingtoni*) is a candidate species for Federal listing and a candidate for State listing. Its range in Washington extends east of the Columbia River from the center of the State southward into Oregon. The known occurrence of this species presently consists of three disjunct populations—two in Washington on the Hanford Reservation and in the Columbia National Wildlife Refuge near Othello and one in Oregon (Betts 1990). The Washington Gap Analysis Program indicates that core habitat for this species includes the southern portions of Grant and Douglas Counties south of Banks Lake, but none is present in the Banks Lake area (Washington Coop. Fish and Wildlife Research Unit 2001). According to The Service (2000), this species was documented in the southeast portion of the study area several years ago.

Life History and Ecology.—This species inhabits sagebrush and grassland in the Columbia Plateau. Betts (1990) found that *S. washingtoni* colonies were found in habitat that had significantly greater values for percent cover of annual grasses, total grasses, and forbs than the surrounding unoccupied habitat. Their range is restricted to the sandy soil regions.

Reasons for Decline.—Grazing, fire, cultivation, and irrigation have degraded and altered much of the vegetation of the Columbia plateau.

Species of Concern

Fringed Myotis

Status and Distribution.—The fringed myotis *(Myotis thysanodes)* is a Federal species of concern. In Washington, it occurs primarily east of the Cascade Mountains. The Washington Gap Analysis Program indicates that the habitat at Banks Lake lies within the core zone of this species (Washington Coop. Fish and

Wildlife Research Unit 2001). Fringed myotis have been documented in nearby Moses Coulee, but not at Banks Lake (Service 2002).

Life History and Ecology.—This is a bat of arid forests, deserts, and grasslands, especially near riparian areas. It roosts in caves, mines, rock crevices, and buildings. It is a colonial species and forms nursery colonies of hundreds of individuals.

Reasons for Decline.—Abandoned mine closures, recreational caving and mine exploration, renewed mining at historic sites, and building and bridge conversion adversely affect roost sites. Pesticide spraying can have direct poisoning effects on fringed myotis populations. Vegetative conversion, livestock grazing, and timber harvest can modify the insect prey base and affect bat populations.

Long-Eared Myotis

Status and Distribution.—This species (*Myotis evotis*) occurs throughout Washington, except in the more arid areas of the central and southeastern part of the State. The Washington Gap Analysis Program shows the habitat at Banks Lake lies within the core zone of this species (Washington Coop. Fish and Wildlife Research Unit 2001). Service (2002) indicates that, while this species has not been documented at Banks Lake, it is likely to occur there. It is a Federal species of concern.

Life History and Ecology.—The long-eared myotis is a species of coniferous forests, roosting in trees, buildings, and rock crevices. It forages around trees and near watercourses in arid areas. Females form small nursery colonies of 1 dozen to 3 dozen individuals.

Reasons for Decline.—This species is vulnerable to roost and maternity colony site destruction or disturbance from abandoned mine closures and recreational impacts. Destruction of prey base by forest and agricultural area pesticide use and contaminants is also a factor.

Pale Townsend's Big-Eared Bat

Status and Distribution.—This bat *(Corynorhinus townsendii)* occurs throughout Washington, except in the highest mountain ranges. The Washington Gap Analysis Program shows the habitat at Banks Lake lies within the core zone of this species (Washington Coop. Fish and Wildlife Research Unit 2001). It has not been documented in Banks Lake, but it has been observed in nearby Moses Coulee. The Service (2002) considers it likely to occur at Banks Lake. It is a State candidate species and Federal species of concern.

Life History and Ecology.—This species occurs from grasslands to forested areas, roosting in trees, buildings, and caves. It forages mostly in uplands, rather than over water or riparian areas. This species relies heavily on abandoned mines for roost and maternity colony sites.

Reasons for Decline.—The primary threat to the big-eared bat is from disturbance or destruction of roost and maternity colony sites from recreational caving, mine reclamation, and renewed mining activity in historic areas. Timber harvest adversely affects roosting and foraging habitat, and pesticide spraying in forests and agricultural areas adversely affects prey base.

Small-Footed Myotis

Status and Distribution.—The small-footed myotis *(Myotis ciliolabrum)* occurs throughout eastern Washington. The Washington Gap Analysis Program shows the habitat at Banks Lake lies within the core zone of this species (Washington Coop. Fish and Wildlife Research Unit 2001). This bat has not been documented at Banks lake, but it has been documented in nearby Moses Coulee. The Service (2002) considers it likely to occur at Banks Lake. It is a Federal species of concern.

Life History and Ecology.—The small-footed myotis occurs in open, arid areas in deserts, chaparral, and pinon-juniper forests, foraging around cliffs, rock outcrops, and dry canyons. It roosts singly or in small groups in cliff and rock crevices, buildings, concrete overpasses, caves, and mines.

Reasons for Decline.—Western small-footed myotis are adversely affected by mine closures and by recreational use of these sites. Destruction of prey base from pesticides and other environmental contaminants also adversely affects this species.

Yuma Myotis

Status and Distribution.—The Yuma myotis (*Myotis yumanensis*) is scattered throughout Washington, except in the highest mountains and extremely arid areas. The Washington Gap Analysis Program shows the habitat at Banks Lake within Grant County lies within the core zone of this species (Washington Coop. Fish and Wildlife Research Unit 2001); however, no habitat is listed for Douglas County. A large roost with more than 1,000 individuals of Yuma myotis has been located near Northrup Creek (Service 2002). It is a Federal species of concern.

Life History and Ecology.—Yuma myotis occur in a variety of habitats, including riparian, scrublands, deserts, and forests. It roosts in bridges, buildings, cliff crevices, caves, mines, and trees. Summer maternity colonies can number several thousand females and young. Males roost singly. This species forages over water, along streams, near springs, and along riparian and shoreline vegetation. It is extremely reliant on water.

Reasons for Decline.—This species can be adversely affected by closure of abandoned mines without adequate surveys and by disturbance of maternity roosts in caves and buildings. Because this species frequently occurs in buildings and other human structures, it is vulnerable to destructive pest control activities. Some riparian and forest management practices may be detrimental.

Black Tern

Status and Distribution.—The Washington Gap Analysis Program indicates the presence of some core habitat for the black tern (*Chlidonias niger*) in the Banks Lake area (Wash. Coop. Fish and Wildlife Res. Unit 2001). This small insectivorous tern occurs Statewide in or near freshwater marshes, ponds, or lakes. A large colony of terns exists on Goose Lake on the Colville Reservation and in Douglas County. There are no breeding records for the black tern at Banks Lake. Service (2002) believes the most likely occurrence of this species at Banks Lake would be during spring and fall.

Life History and Ecology.—The preferred summer habitats are inland marshes and sloughs with dense cattail or other emergent vegetation (aquatic macrophytes) interspersed with open water. It is a colonial nester.

Reasons for Decline.—The continuing loss and degradation of breeding habitat, due to wetland drainage, is the main reason for the decline in black tern populations. Reduced hatching success in the Midwestern States may be due to agricultural pesticides.

Columbia Sharp-Tailed Grouse

Status and Distribution.—This State threatened subspecies (*Tympanuchus phasianellus columbianus*) was documented in the past in Barker Canyon and, possibly, Northrup Canyon (Service 2002). The Washington Gap Analysis Program indicates that core habitat for this species exists in the vicinity of Banks Lake in Douglas County (Washington Coop. Fish and Wildlife Research Unit 2001). Approximately 700 birds occur in north-central Washington in small, scattered populations (Fed. Register 1999).

Life History and Ecology.—The Columbia sharp-tailed grouse is found in shrub-steppe, grassland, mountain shrub, and deciduous riparian habitats.

Reasons for Decline.—The population of this grouse has declined substantially as a result of habitat loss and degradation. Conversion of native habitats to agricultural crop use, livestock grazing, and suburban development, as well as dam construction, herbicide spraying, and fire continue to threaten this subspecies (Fed. Register 1999).

Loggerhead Shrike

Status and Distribution.—The loggerhead shrike (*Lanius ludovicianus*) is a State candidate species. The Breeding Bird Atlas shows breeding records for the Banks Lake area for this shrike. The Washington Gap Analysis Program also lists core habitat for this species in the Banks Lake area (Wash. Coop. Fish and Wildlife Res. Unit 2001). The Service (2002) indicates that six individuals were observed during 1998 breeding bird surveys at Banks Lake.

Life History and Ecology.—This predatory bird of open areas of shrub-steppe, pine-oak, and pinon-juniper woodlands zone feeds on insects, small birds, and mammals.

Olive-Sided Flycatcher

Status and Distribution.—The Breeding Bird Atlas data do not show any documented sightings for this species (*Contopus borealis)* in Grant or Douglas Counties. Additionally, the Washington Gap Analysis Program does not show Banks Lake to be either core habitat or peripheral habitat (Washington Coop. Fish and Wildlife Research Unit 2001). The Service (2002), however, indicates that it is likely to be present in Northrup Canyon, immediately adjacent to Banks Lake. This is a Federal species of concern.

Life History and Ecology.—This flycatcher typically nests high in conifer trees. It forages for flying insects from snags and other high perches.

Reasons for Decline.—Though this species occurs over a very large range, its overall density is low. Its populations have declined precipitously in most regions, with an overall loss of 67 percent noted since 1966. Deforestation in its neotropical wintering range, as well potential adverse impacts from silvicultural and other land-use practices (Cornell Lab 2001), contribute to its decline.

Western Burrowing Owl

Status and Distribution.—This State candidate species and Federal species of concern is found in the shrub-steppe zone of central Washington. The Breeding Bird Atlas has no documented sightings of burrowing owl at Banks Lake. The Washington Gap Analysis Project indicates that core habitat exists near Banks Lake, but not within the study area (Washington Coop. Fish and Wildlife Research Unit 2001). According to The Service (2002), it has not been documented at Banks Lake.

Life History and Ecology.—This small owl prefers open, broken, or flat areas in shrub-steppe or agricultural areas. It requires ground squirrel or other mammal burrows for nesting.

Reasons for Decline.— Populations are declining, due to widespread elimination of burrowing rodents, primarily prairie dogs and ground squirrels. Loss of habitat from conversion of rangeland to irrigated land and, in some areas, loss of habitat to suburbanization are major threats to this owl. Burrowing owls are usually tolerant of human activity but vulnerable to predation by domestic pets.

Northern Sagebrush Lizard

Status and Distribution.—The northern sagebrush lizard (*Sceloporus graciosus graciosus)* occurs primarily in the shrub-steppe zone in central Washington. The Washington Gap Analysis Project indicates that the area of Banks Lake is in the peripheral zone of this species, rather than in the core zone (Washington Coop. Fish and Wildlife Research Unit 2001). This species has not been documented in Banks Lake (Service 2002). It is a Federal species of concern.

Life History and Ecology.—This lizard inhabits desert floors, mountain and forest slopes, and open flat lands. Sagebrush areas are preferred habitats, though the lizard does not climb into the bushes. It occurs mainly on fine gravel soils and sandy and rocky soils adjacent to water. It requires rock crevices, mammal holes, or other cover.

Reasons for Decline.—Habitat loss, due to conversion of sagebrush to agricultural uses and intensive livestock grazing, are the primary threats to this species. Additionally, aerial spraying of pesticides may adversely affect its prey base.

Columbia Spotted Frog

Status and Distribution.—The Columbia spotted frog (*Rana luteiventris*) has been documented in the Banks Lake area (Service 2002), as well as in areas scattered across much of eastern Washington. The Washington Gap Analysis Program indicates that much of Banks Lake is in the peripheral zone of this species, rather than in the core zone (Washington Coop. Fish and Wildlife Research Unit 2001). This species population has dramatically declined in the last 50 years. It has been virtually eliminated from the Puget Sound. It is a State candidate species.

Life History and Ecology.—This frog prefers warm water marshes, wetlands, and bogs with nonwoody wetland vegetation. Vegetation in breeding pools generally consists of grasses, sedges, and rushes. It has a slow development rate, taking from 4 to 6 years to reach sexual maturity (Turner 1960).

Reasons for Decline.—The presence of introduced predatory fish into previously fish-free water bodies has contributed to the decline of amphibians in western North America (Corn 1994). Additionally, habitat loss and degradation, due to wetland drainage, urbanization, livestock grazing, and logging, have also contributed to its decline. Its slow development rate also subjects it to increased disturbance and competition from more robust exotics, such as bullfrogs.

California Floater

Status and Distribution.—This mussel (*Anodonta califoriensis)* has been extirpated from much of its original distribution, from southern British Columbia south to northern Baja California, and east to Wisconsin and Arizona. In Washington, it is presently found only in Curlew Lake in Ferry County (Pacific Biodiversity Institute 2002). It has not been documented at Banks Lake (Service 2002). It is a Federal species of concern and a State candidate species.

Life History and Ecology.—This mussel prefers unpolluted lakes and slow streams in areas less than 6.6 feet deep with sandy bottoms or mud bottoms (Service

2002). Juveniles are parasitic on the gills, fins, and barbels of fish. The fish species selected is usually a minnow of the Gila genus. The host fish forms a cyst around the parasitic larvae and is unharmed by it.

Reasons for Decline.—The California floater has very narrow requirements for finding and attaching to an appropriate fish host. The decline in native host fish species is the likely cause for the decline of this mussel (Pacific Biodiversity Institute 2002). Pollution, sedimentation from logging and grazing, dam building, and exotic fish introductions may also have contributed to its decline.

Chelan Rockmat

Status and Distribution.—This species *(Petrophyton cinerascens)* is endemic to cliffs along a 17-mile area on the Columbia River between Chelan and Wenatchee, in Chelan and Douglas Counties, Washington. The Service (2002) indicates that it may also potentially occur along the basalt cliffs of Banks Lake. It is a State threatened species.

Life History and Ecology.—Chelan rockmat is a low, mat-forming perennial with 2- to 6-inch-tall flowering stems. This species has an extremely narrow range, suggesting it lacks competitive vigor or has a nutrient requirement met only by a specific substrate (Washington DNR 2001). It has been found only in crevices and ledges of open cliffs and rock outcrops along the Columbia River.

Reasons for Decline.—Habitat destruction from rock quarrying, road construction, and power line and radio tower construction are thought to be the principal threats to this species. Recreational activities, such as rock climbing, may also have adverse impacts.

Sticky Phacelia

Status and Distribution.—This species *(Phacelia lenta)* is endemic to a small area along the basalt cliffs of the Columbia River, in an area of approximately 12 by 8 miles in Douglas County, Washington. It occurs on crevices and adjacent open rocky habitats. Elevations range from 1300 to 3400 feet. Recent searches of suitable habitat have not located any specimens outside of Douglas County (Washington DNR 2001). The Service (2002) indicates that it may also occur along the basalt cliffs of Banks Lake. It is a State threatened species.

Life History and Ecology.—Sticky phacelia occurs in basalt outcrops with generally very little other vegetation present. However, it is speculated that competition may be high for these sites, given the lack of soil and limited water availability.

Reasons for Decline.—Direct destruction of this plant's habitat is the major threat to its long-term survival. Rock quarrying and road construction should be avoided in this species' habitat. Aerial herbicide application on adjacent agricultural fields may also pose some threat.

Recreation

Banks Lake is recognized locally and regionally for its diverse and outstanding recreational opportunities. The reservoir's clear waters support one of the finest fisheries in the state and outstanding opportunities exist throughout the area for camping, swimming, boating, picnicking, and other recreational pursuits.

Many recreationists are drawn to Banks Lake because of the diverse and scenic natural features of the area (e.g., basalt outcrops and spectacular coulee walls) and areas unique to the region (e.g., Northrup Canyon). The coulee walls rising on the east and west sides of the reservoir enclose and separate Banks Lake from the surrounding agricultural and high desert landscape, giving recreationists, residents, and other users a strong sense of place and isolation. The small incorporated communities on the north and south ends do not detract from the remoteness that is possible at Banks Lake.

Public use varies seasonally, with peak activity and visitation occurring from mid-May through September. Local residents use the area, as well as many visitors who generally travel 100 to 200 miles. Most out-of-area users are from the Puget Sound (Seattle/Tacoma) area, who are looking for uncrowded recreational opportunities, sunny days, and warm water. The Banks Lake Visitor Profile and Recreational Use Study survey conducted in 1998 showed camping, swimming, and fishing to be the area's most popular activities. More than 500,000 persons annually visit Steamboat Rock State Park (SRSP).

Grant County residents generally use the reservoir and surrounding lands during the day, but the lake is a popular overnight destination for visitors from other parts of the state. Grand Coulee Dam, a regional tourist attraction, draws many first-time visitors to the Banks Lake area. Apart from the Grand Coulee Dam Visitor Arrival Center and Lake Roosevelt National Recreation Area, other attractions near Banks Lake log between 7,650 and 45,715 annual visits each. Cumulatively, the area's attractions registered over 2.6 million visitors in 1997 (see table 3-5), about the same as in the preceding years in the decade.

A variety of public agencies and private entities currently provide 19 developed recreation areas. These areas are served by a wide range of developed day and overnight recreation sites and facilities, and generally are concentrated at the south and northeast ends of the reservoir.

Table 3-5.—Visitation to Grand Coulee/Banks Lake area, FY 1997

Facility	Visitors
Grand Coulee Dam Visitor Arrival Center	467,347
Lake Roosevelt National Recreation Area	1,462,820
Steamboat Rock State Park	583,496
Crown Point Vista	45,715
Roosevelt Recreation Enterprise Houseboat Rentals	13,559
Coulee Playland Resort	20,000
Colville Tribal Museum	12,179
GCDA Chamber of Commerce	13,231
Coulee Dam Visitors Center	7,650
Dry Falls Interpretive Center	17,542
Total	2,643,539

Source: Grand Coulee Dam Area Chamber of Commerce, 1998

Land-Based Recreation

Land-based recreation activities include both developed and dispersed camping, bank fishing, sunbathing, hunting, off-road vehicle (ORV) riding, picnicking, hiking, bicycle and horseback riding, nature study (wildlife and wildflower observation), sightseeing, and photography. Of these, camping and hunting are the most popular.

Recreation use survey respondents ranked camping as the most important and common recreation activity at Banks Lake. Overnight opportunities include fully developed recreational vehicle (RV) and tent sites, as well as dispersed, informal campsites. Full-service RV utility sites and formal tent sites are provided at Coulee City Community Park, Steamboat Rock State Park, Coulee Playland, and Sunbanks Resort. The Jones Bay, Osborn Bay Southwest, and Dry Falls campgrounds offer a range of developed facilities (e.g., vault toilets, fire rings, picnic tables, and pedestal grills), but no RV utility hookups.

While much of the recreation use is concentrated at developed recreation sites, either managed directly by the state (e.g., Steamboat Rock State Park), under lease from the state (e.g., Sunbanks Resort, Coulee Playland), or under lease from Reclamation (e.g., Coulee City Community Park), a significant amount of dispersed use occurs in undeveloped areas along the lake's shoreline. The most popular dispersed camping areas occur in the following general locations: southeast Banks Lake south of the Million Dollar Mile North Boat Launch, Kruk's Bay/Airport Bay, Osborn Bay, Barker Flat, Old Devils Lake/Lovers Lane, and along the Steamboat Rock peninsula's west shore. These areas are accessed primarily by the area's primitive road system and/or by boat. In 1998, 56 heavily used, dispersed campsites were inventoried.

Located on Reclamation lands northwest of the Banks Lake Golf Course and east of the airstrip, the ORV area encompasses 130 acres and contains an ORV track and archery range. The archery range consists of several scattered hay-bale-mounted targets and a small parking pullout.

Day Use Activities

Many developed and dispersed day use opportunities exist at Banks Lake. Developed picnic sites and playgrounds are offered at Coulee City Community Park, Steamboat Rock State Park, Coulee Playland, and Sunbanks Resort. Day use activities include fishing, boating, sun bathing, hiking, ORV and horseback riding, bicycling, archery, model airplane flying, sightseeing, water skiing, scuba diving, wind surfing, personal water craft (e.g., jet skis), rock climbing, wildlife observation, cross country skiing, showshoeing, and ice fishing. Golfing is available at the Banks Lake Public Golf and Country Club.

Hunting begins in September with the opening of dove season and extends through mid-March. The general hunting season for mule deer, white tail deer, upland birds, and waterfowl begins in October. Upland game birds include quail in the brushy draws; chukar in hilly, rugged terrain; and Hungarian partridge and Canada geese in the stubble agricultural fields. Duck hunting is popular on Banks Lake and in the region's small potholes and lakes. Mule deer can be found in the sagebrush-covered flats and draws surrounding the Grand Coulee.

Nature study, wildlife watching, and hiking are increasingly popular activities. The Banks Lake area supports a variety of wildlife observation opportunities, trails, scenic vistas, and unique plant communities (e.g., Northrup Canyon Natural Area) for study. Migratory and resident birds include great blue herons, white pelicans, sandhill cranes, hawks, long-horned owls, and bald eagles. Mammals like deer, beaver, muskrat, and rabbit are abundant. There are constructed trails in the Steamboat Rock State Park Recreation Area, which includes the Northrup Canyon Natural Area and Steamboat Rock, and at Sunbanks Resort (a WDNR leased facility).

Water-Based Recreation

At full pool, the reservoir surface covers approximately 27,400 acres and provides approximately 82 miles of shoreline. The reservoir offers excellent opportunities for water-based activities such as boating, fishing, water skiing, personal water craft (PWC) riding, wind surfing, and swimming. The highest concentration of boating activity occurs in the Devil's Punch Bowl, Osborn Bay, Kruk's Bay/Airport Bay, and Jones Bay areas. The reservoir surface is open to motorized boating with few restrictions.

User fees are required at the three boat launch sites managed by the SPRC (see table 3-6). A charge of $5 is assessed at the SRSP Day Use Area and Boat Launch and

Steamboat Rock Rest Area and Boat Launch, and a $5 fee is assessed at the Osborn Bay SW Campground and Boat Launch. Annual, unlimited boat launch permits are available for $40. Camping fees at SRSP, Coulee Playland, and Sunbanks Resort include use of boat launch facilities. Although launch fees are not required at Coulee City Community Park, a donation box is provided.

Table 3-6.—Boat launch sites and operation and maintenance responsibilities.

Responsible organization	Boat launch sites
Washington State Parks and Recreation Commission	Osborn Bay Southwest Campground and Boat Launch
	Steamboat Rock State Park Day Use Area
	Steamboat Rock Rest Area and Boat Launch
Washington Department of Fish and Wildlife	Osborn Bay Southeast Boat Launch
	Dry Falls Boat Launch
	Dry Falls Campground and Boat Launch
	Barker Flat Campground and Boat Launch*
	Million Dollar Mile North Boat Launch
	Million Dollar Mile South Day Use Area and Boat Launch
Sunbanks Resort Lessee	Sunbanks Resort
Coulee Playland Concessionairre	Coulee Playland
Coulee City	Coulee City Community Park

*No operation and maintenance activities are currently performed by the Washington Department of Fish and Wildlife.

No direct user fees are currently required at the six boat launch sites managed by the WDFW. However, state legislation passed in March 1998 requires motor vehicles using marked WDFW access sites to display a current annual fish and wildlife “stewardship decal.” The annual fee for the stewardship decal is $10, but they are issued at no charge to people who buy an annual saltwater, freshwater, combination, small or big game hunting, or trapping license. A fee of $5 is charged for additional decals if people want to put them on their other vehicles. Failure to display a decal while parked in a WDFW access site could result in a fine. The revenue generated through decal sales is used for access site stewardship and maintenance. Signs are prominently displayed at the WDFW sites where a decal is required.

During reservoir drawdowns, rocks and sandbars are sometimes exposed or lie just below the surface, causing the Dry Falls, Million Dollar Mile North and South, Barker Flat, and Osborn Bay Southeast boat launches to become difficult to use. Launching is reported to increase at the Steamboat Rock Rest Area and Boat Launch during low reservoir water surface elevation periods (Steinmetz 1998).

Swimming is ranked as the second most common activity on Banks Lake. Developed swimming areas are provided and maintained at the SRSP Day Use Area, Coulee City Community Park, Coulee Playland, and Sunbanks Resort. Coulee City Community Park sometimes experiences stagnant water conditions in their swimming area. Consequently, the city is considering the installation of an aeration device or other measures to improve the park's swimming area. Periodically low water levels in the swimming area are also a concern.

Users rank fishing as the second most important and third most common activity in the area. Banks Lake is regarded as one of the finest fishing lakes in the state for bass, perch, and walleye, and offers great fishing opportunities year-round. Popular fishing areas for smallmouth bass are Barker Cove and along the western shore of the Steamboat Rock peninsula; Osborn Bay, Kruk's Bay, Jones Bay, and Devil's Punch Bowl for largemouth bass; and deep water near Barker Flat for walleye and rainbow trout. During the winter season, ice fishing is popular and can last as long as 4 months.

Boat Launch Sites

The WDFW is responsible for the operation and maintenance of six boat launch sites, and the SPRC is responsible for three boat launch sites at Banks Lake (see table 3-6). Operation and maintenance for the other boat launches located on the reservoir (Sunbanks Resort, Coulee Playland, and Coulee City Community Park) are the responsibility of the respective lessee or concessionaire.

Economics

Hydropower Resources—FCRPS

Banks Lake and the pump-generating plant that pumps water into Banks Lake are an integral part of the Grand Coulee power generating complex and are also used as a means of regulating Federal Columbia River Power System (FCRPS) power production. The pump-generating plant houses six pump/generators and six pumps. Banks Lake plays an important part because of its use in regulating power system loads by both generating and using power.

The Grand Coulee power complex is one of 14 Federal power projects in the Columbia River drainage that are interconnected by the Bonneville Power Administration transmission system to form the FCRPS project on which the action agencies consulted in the 2000 BiOp. The FCRPS facilities are coordinated with other utilities to take advantage of differences in streamflows, loads, generation, and maintenance schedules to better use their resources. Utilities can then more efficiently use their hydropower and thermal facilities. This coordination allows the system to be operated as if it were owned by a single operator, synchronizing operations to maximize power production. Grand Coulee provides about one-third of the FCRPS's total generating capacity.

The Grand Coulee power complex consists of three powerplants and a pump-generating plant. The power complex generates around 21 billion kilowatt hours (kWh) annually of which about 900 million kWh (4.7 percent) is used for pumping CBP irrigation water. The rest is marketed commercially by BPA, the Federal power marketing agent for the Pacific Northwest. BPA markets the power primarily through its own transmission lines in Washington, Oregon, Idaho, western Montana, and small parts of Wyoming, Nevada, Utah, California, and eastern Montana. BPA also sells or exchanges power with utilities in California and Canada.

BPA schedules and markets the generation from Grand Coulee. Power operations must conform to several multiple use operation requirements, such as flood control, fish augmentation flows, FDR Lake daily drawdown limitations, downstream flow fluctuation limits due to bank instability, etc. Scheduling of the BPA load is divided into two categories, heavy load hours of 6 a.m. to 10 p.m. Monday through Saturday, and light load hours for the remainder of the time. Commonly, only a few of the large units will be run during light load hours, while many more units will run, often including the pump/generator (P/G) units during heavy load hours to help balance and meet BPA system loads.

Left and Right Powerplants

The Left Powerplant and Right Powerplant, at the Grand Coulee complex, are operated for commercial power purposes and during the irrigation season to provide power for Pumping Plant units 1-6. Generators 1, 2, and 3, located in the left powerhouse, are each used to provide pumping power directly to Pumps 1-6 without being connected to the transmission system. Residual power not used for CBP purposes is provided to the 230-kilovolt (kV) switchyard for commercial use.

Third Powerplant

The Third Powerplant is operated for commercial power purposes and provides power to the 500-kV switchyard for distribution by BPA through their distribution grid. During an average year, approximately 50 percent of the total energy production is generated by the Third Powerplant. An important contribution of the Third Powerplant is its ability to provide "spinning reserve" to the FCRPS. Generators are provided enough water to keep them spinning yet not generating any appreciable amount of power; this allows for an almost instantaneous ability to provide power for unexpected or unusually high demands. This spinning reserve is a much more cost efficient means of providing for immediate power needs than coal- or gas-fired generation.

Pump-Generating Plant

The primary purpose of the plant is to pump water for irrigation delivery to CBP lands via Banks Lake. For the period of 1989-1998, a 10-year average of 2,592,000 acre-feet of irrigation water has been pumped for irrigation. The pumping season runs about 198 days, from approximately April 1 through October 15 of each year. Pumping needs are weather dependent and normally increase during the hottest months of July and August. However, if a constant pumping rate were required for

198 days of the irrigation season, an average pumping rate of approximately 6,600 cfs would be needed.

Each of the six P/G plant pumps is rated at 65,000 horsepower and is capable of pumping 1,600 cfs at 292 to 310 feet of head. Each of the six pump-generators is rated at approximately 67,000 horsepower and 50,000 kilowatts (kW) in the generation mode. Total plant pumping capacity is approximately 20,000 cfs, depending on pumping head. The excess pumping capacity allows the P/G plant to be used in a "load management" mode. Pumping schedules can be managed to allow delivery of water into Banks Lake when power demands are low and accordingly power purchase costs are also low. This load management typically results in heavy pumping during the night and weekend hours with little or no pumping during power "peak" hours. This operation not only provides load management but enhances Federal revenues by consuming power (pumping) when power has its least value and allowing maximization of generation and sales when revenues are highest. As Banks Lake level drops, use of the P/G units is affected. To operate all six P/G units, the lake surface must be above elevation 1568 feet. As the lake lowers, fewer units can operate—five units can operate at elevation 1566.5 feet, four units at 1565 feet, three units at 1563.5 feet, two units at 1562 feet, and one unit at 1560.5 feet.

The 6 pump-generators provide 300,000 kW when in the generating mode. When using the 6 pumps and the 6 pump-generators for pumping 600,000 kW of power are used. This provides a "load swing" of 900,000 kW. This operational flexibility contributes a great deal of versatility when managing the FCRPS, both from a system operation and a marketing perspective.

The P/G units also provide peak pumping capability to ensure CBP irrigation water deliveries during the heavy delivery months of July and August. Pumping capacity of the original six pumps is limited to approximately 10,000 cfs. Irrigation deliveries in July and August may require that pumping by the six pumps continue full time; thereby losing the financial advantage of pumping during low load hours. Operations of the P/G units allow meeting those irrigation demands without undue fluctuation of Banks Lake.

Typical weekday summer pumping normally takes place from about 10 p.m. the previous day to 8 a.m. of the current day. The number of pumps operated depends on the amount of irrigation withdrawals taking place. At 8 a.m., the pumps and P/Gs running in the pump mode are stopped. The P/G units may then be restarted in the generation mode if needed to meet power load requirements or spinning reserve demands. BPA typically does not use Banks Lake for pump generation during the irrigation season; it becomes more valuable for pump generation December through February.

Typically, on Fridays at approximately 10 p.m., the pumps and P/G units are started to provide continuous pumping throughout the weekend until 8 a.m. on Monday.

The number of units used will depend on irrigation withdrawals and the need to refill Banks Lake.

During the winter nonirrigation season, the P/G plant is operated only to meet power requirements. The P/G units may be operated to either produce energy or meet system requirements, such as spinning reserve or standby reserves. System requirements are significantly affected by weather conditions. Severe cold spells may result in operation of the P/G units in the generation mode. Stabilization of Banks Lake is maintained at winter levels by pumping into the lake the water needed to replace water used for generation. In addition to replacement of water used for generation, additional water is pumped to make up for evaporation and seepage.

Powerplant on the Main Canal below Banks Lake and Dry Falls Dam—GCPHA

A municipal low head hydropower generation plant is located just below Dry Falls Dam on the Main Canal and is owned by the three irrigation districts that receive CBP water. This facility generates power for commercial sale from CBP irrigation water releases from Dry Falls Dam and is not part of the FCRPS. The Main Canal powerplant is operated by the Grand Coulee Project Hydroelectric Authority (GCPHA), who markets the power through contracts with the cities of Seattle and Tacoma, Washington. Generating capacity is 26 MW for the plant with annual generation averaging 92,000 MWh. As a condition of the Federal Energy Regulatory Commission (FERC) licensing for the powerplant, barrier nets must be placed in Banks Lake at the beginning of the kokanee salmon entrainment period (May 15) and remain in place until the end of the irrigation season.

Public Utility District Powerplants on the Columbia River

There are five publicly owned hydropowerplants on the Columbia River in Washington downstream of Grand Coulee and Chief Joseph Dams. They are Wells Hydoelectric Project owned and operated by Douglas County Public Utility District (PUD), Rocky Reach and Rock Island hydro-projects owned and operated by Chelan County PUD, and Priest Rapids and Wanapum Developments owned and operated by Grant County PUD. The operation of these five powerplants is coordinated with the FCRPS, and they all have fish passage structures.

Wells Hydroelectric Project

This project is located 15 minutes north of Chelan, Washington, at river mile 515.6 and is the chief generating resource for Douglas County PUD, producing its first commercial power generation in 1967. The project has ten generating units rated at a combined 840 MW and provides power to Douglas County PUD, Puget Sound Energy, Portland General Electric Company, PacifiCorp, Avista Corporation, and the Okanagan County PUD (Douglas County Public Utility District 2002).

Rocky Reach Project

This project is located about 7 miles upstream from the city of Wenatchee, Washington, at river mile 473.7 and consists of 11 generating units that have a combined capacity of 1,287 MW. The initial seven generators were placed in commercial operation in November of 1961, with an additional four generators being added and placed in service in 1971. Electric output is provided to the Chelan County PUD distribution system and its 7 million customers, as well as the regional grid of BPA (Chelan County Public Utility District, Rocky Reach Hydro Project, 2002).

Rock Island Project

The Rock Island Project is located about 12 miles downstream from Wenatchee, Washington, at river mile 453.4 and consists of a dam and two powerhouses. The first powerhouse was constructed and placed in service in 1933 and consisted of four generating units. An additional six units were added and placed in service in April of 1953, bringing the total generating capacity of the ten units to 212 MW.

The second powerhouse with its eight generators was placed in commercial operation in August of 1979 and has a capacity of 410.4 MW, making the total nameplate capacity of both powerhouses 632.4 MW. Electric output is delivered to Chelan County PUD distribution system in the Wenatchee area and also to the BPA transmission grid (Chelan County Public Utility District, Rock Island Hydro Project, 2002).

Priest Rapids Development

The Priest Rapids Development consists of a dam and hydroelectric generation station with a rated capacity of 955.6 MW. It is located at river mile 397.1 and began commercial power generation in October of 1959. About 64 percent of the electric output is distributed through the transmission network of the BPA to 12 purchasers, with the remaining output being used by Grant County PUD (Grant County Public Utility District 2002).

Wanapum Development

The Wanapum Development consists of a dam and hydroelectric generation plant 18 miles upstream from the Priest Rapids Development, at river mile 415.8. The generating plant consists of ten units and has a total capacity of 1,038 MW and has been in commercial operation since January 1965. Electric output is delivered to the BPA transmission network for distribution (Grant County Public Utility District 2002).

Regional/Local Economy

Banks Lake is located along the northern border of Grant County, although some relatively small areas of the western shoreline of the lake extend into Douglas County. The steep cliffs that surround most of Banks Lake limit access to the lake, especially on the west side of the reservoir. State Route 155 runs along the east side of the lake and provides primary access to the lake and most developed recreation facilities. Any impacts on the economic environment from the Action Alternative due to changes in recreation use of the lake would be expected to occur in Grant County. For these reasons, Grant County is selected as the affected area for this study. The following information was used as the basis for analyzing impacts on the local economy.

Grant County is a mostly rural area with small towns scattered throughout the county. The entire county has a population of 74,698 (U.S. Census Bureau 2000g). This figure represents an increase of 36.4 percent over the 1990 population. However, the county only accounts for approximately 1.3 percent of Washington's population—5,894,121 (U.S. Census Bureau 2000h). Moses Lake (located in south central Grant County) is the largest city with a population of 14,953. Farther north is the county seat, Ephrata, which is about 30 miles south of Coulee City. Coulee City is found at the southern end of Banks Lake. Ephrata has a population of 6,808 and Coulee City has a population of 600 (U.S. Census Bureau 2000a, 2000c). Electric City, population 922, is located at the north end of Banks Lake (U.S. Census Bureau 2000b). The town of Grand Coulee is farther northeast near the Grand Coulee Dam.

In 1999, the people of Grant County had a per capita personal income (PCPI) of \$19,424. The county ranked 32 out of the 39 counties in Washington (Bureau of Economic Analysis 2001a). This PCPI was only 64 percent of the State average of \$30,380 and 68 percent of the national average, \$28,546 (Bureau of Economic Analysis 2001b). Income and employment data for 1999 are shown in table 3-7.

Total personal income amounted to \$1,398,915,000. This amount ranked 18 in the State, and Grant County accounted for 0.8 percent of the State total. Farming accounted for 11.3 percent or \$158,160,000 of the total. Total employment amounted to 38,743 full- and part-time jobs. Employment in farming provided 18.7 percent of these positions, the most of any economic sector. Services (17.2 percent) and government (16.6 percent), at all levels, were the next most important sectors for employment.

The earnings of people employed in Grant County amounted to \$919,294,000 in 1999. The largest industries, by earnings, were State and local government (22.1 percent of total earnings), manufacturing (16.7 percent on total earnings), and farming (14.7 percent of total earnings).

In 1990, the unemployment rate for Grant County was 8.5 percent (Bureau of Labor Statistics 2000). This rate rose to 10.6 percent in 1996 and fell to 10.1 percent in the

Table 3-7.—Employment and income data for Grant County, 1999

Economic sector	Employment *		Personal income and earnings**	
	Number of jobs	Percent of total	1999 dollars	Percent of total
Total	38,743	100.0	1,398,915,000	100.0
Wage and salary workers	30,999	80.0	800,725,000	57.2
Proprietor's	7,744	20.0	118,569,000	8.5
Farm occupations	7,230	18.7	134,997,000	9.7
Non-farm occupations	31,513	81.3	784,297,000	56.1
Ag services, forestry, and fishing	1,766	4.6	27,989,000	2.0
Mining	(D)		(D)	
Construction	1,520	3.9	46,230,000	3.3
Manufacturing	5,027	13.0	153,495,000	11.0
Transportation and public utilities	1,469	3.8	47,879,000	3.4
Wholesale trade	1,592	4.1	48,820,000	3.5
Retail trade	5,506	14.2	94,168,000	6.7
Finance, insurance, and real estate	(D)		(D)	
Services	6,680	17.2	119,171,000	8.5
Government	6,444	16.6	223,220,000	16.0
Plus: Dividends, interest, and rent			270,788,000	19.4
Plus: Transfer payments			276,163,000	19.7
Plus: Personal contributions for social insurance			(44,984,000)	-3.2

*Employment in full- and part-time jobs.
**Personal income and earnings in thousands of 1999 dollars.
(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.
Source: Bureau of Economic Analysis, Regional Economic Information System, 1999 (Bureau of Economic Analysis 2001c, 2001d.

year 2000. The poverty rate in Grant County declined from 19.6 percent in 1989 to 17.7 percent in 1993 and then to 14.9 percent in 1997 (U.S. Census Bureau 2000e, 2000f, 2000i). This rate was still much higher than the Washington State average of 10.2 percent.

A regional input-output model, Impact Analysis for Planning (Implan), was used to establish the baseline economic conditions in Grant County. This version of Implan (Professional 2.0) utilizes 1998 data, which are the most current available. Implan analysis identified the total industry output for Grant County, Washington, as being $3,384,384,000 in 1998 (Minnesota Implan Group, Inc. 1998, 1999, 2000). At the same time, the Grant County economy supported 37,709 jobs, and labor income was $938,912,000.

An examination of U.S. Census Bureau employment data for the year 2000 shows that the economy in the North Grant County area accounted for only 5.4 percent of the total employment in the county. In addition, the local North Grant County economy is more diversified than commonly thought (see table 3-8). These employment data indicate that recreation related industries, including the categories of Arts, Entertainment, Recreation, Accommodations, and Food Services account

Table 3-8.—Number of jobs by industry for Grant County and North Grant County

Industry	Grant County jobs	Grant County total jobs	Banks Lake South CDP	Coulee City	Coulee Dam (town)	Electric City	Soap Lake	Totals by industry for north Grant County	North Grant County total jobs
	Number	Percent	Number					Number	Percent
Agriculture, forestry, fishing & hunting, and mining	5,528	18.8	10	40	16	2	50	118	7.4
Construction	1,490	5.1	2	21	21	21	26	91	5.7
Manufacturing	3,721	12.7	-	19	-	15	66	100	6.3
Wholesale trade	1,376	4.7	-	15	5	7	9	36	2.3
Retail trade (Some but not all of these positions may be recreation related.)	3,109	10.6	12	20	44	34	68	178	11.2
Transportation & warehousing and utilities	1,748	6.0	7	7	27	54	22	117	7.4
Information	276	0.9	1	7	2	6	11	27	1.7
Finance, insurance, real estate, and rental and leasing	837	2.9	-	6	21	13	18	58	3.7
Professional, scientific, management, administrative, and waste management services	1,505	5.1	3	8	17	16	18	62	3.9
Educational, health and social services	5,353	18.2	15	38	100	70	109	332	20.9
Arts, entertainment, recreation, accommodation, and food services	2,012	6.9	4	14	79	48	51	196	12.4
Other services	1,145	3.9	-	14	22	27	19	82	5.2
Public Administration	1,264	4.3	-	7	93	66	22	188	11.9
Total	29,364	100.0	54	216	447	379	489	1,585	100.0
	5,121	17.4	Recreation related employment				374		23.6

CDP = Census Designated Place
Source: U.S. Bureau of the Census, Census 2000

for only about 12.4 percent of the employment. Retail trade employs about 11.2 percent—some of which may be recreation related. Other non-recreation sectors account for more than three-fourths of the jobs in North Grant County. Employment in recreational related industries in the North Grant County area is, on a percentage basis, somewhat more important in this area than it is for Grant County as a whole (12.4 percent verses 6.9 percent).

Irrigated Agriculture

The CBP currently supplies water for full irrigation of approximately 670,000 acres, but the CBP has been authorized for more than 1 million acres. All water for the CBP is supplied from the Columbia River through Banks Lake with the exception of three small pumped irrigation blocks in the Pasco area and minor contributions that are made by Crab Creek and Rocky Ford Creek. The CBP extends from an area south of Banks Lake to lands south of the confluence of the Snake River with the Columbia. The Columbia River, from Trinidad to Pasco, forms the western boundary of the irrigated lands.

Up to 67 different crops are grown in the CBP, with alfalfa, potatoes, apples, and vegetables being major contributors to over a half billion dollars worth of crop value each year. Reclamation currently diverts about 2.6 million acre-feet of water from the Columbia River for delivery to irrigators within the CBP. Reclamation utilizes a water right from the State of Washington, which the United States holds in trust for the irrigators. At Banks Lake, it is possible for Reclamation to deliver the capacity of the Main Canal (10,000 cfs) down to water surface elevation 1540 feet.

In the event that the pumping plant were to be completely offline and unavailable on August 31, with no possibility of returning to service before October 31, and if Banks Lake were to be at elevation 1560 feet on August 31, then Banks Lake would, in an average diversion year, experience a near-maximum draft to meet the September and October irrigation demands. (The chances of such a scenario actually occurring would appear to be very low.) Additionally, over the last 10 years, 3 years—1993, 1994, and 2001—would have exceeded the available supply from Banks Lake in the given worst-case scenario as shown in table 3-9.

Table 3-9.—Available water supply to meet demands

Year	August	September	October	September + October
1993	418,590	270,330	186,880	457,210
1994	448,978	300,660	208,958	509,618
1995	411,591	260,437	137,655	398,092
1996	460,411	272,942	142,026	414,968
1997	410,867	220,590	120,266	340,856
1998	458,349	280,155	150,514	430,669
1999	424,231	277,133	171,844	448,977
2000	431,104	228,406	136,590	364,996
2001	399,142	299,750	196,747	496,497
2002	433,183	297,473	117,990	415,463
Average	429,645	270,788	156,947	427,735
Percent of total	17	11	6	

Historic Resources

Historic resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archeological, cultural, and scientific importance. There is a legislative and regulatory basis that requires the identification, evaluation, protection, and management of historic resources in Federal undertakings. The following discussion is responsive to the data needs required principally by the National Historic Preservation Act of 1966, as amended. Specific site locations are prevented from disclosure by the Archeological Resources Protection Act (ARPA) of 1979. The latter, and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 define notification and tribal consultation processes to follow in the event of an inadvertent discovery of human remains of Indian ancestry during an undertaking on Federal lands. It also encourages agencies to have a discovery plan in place where actions will occur in an area that has the potential for human remains. And finally, it defines a process for agencies to use to determine if recovered human remains are affiliated with federally recognized Tribes and a process for disposition of affiliated remains.

Previous Investigations

In 1947, prior to inundation, Banks Lake was surveyed for archeological sites by the Columbia Basin Archaeological Survey under the direction of the Smithsonian Institution (Drucker 1948). Fifteen sites were recorded in and adjacent to Banks Lake, of which nine are known to be inundated, four are above the flood pool, and the location of one is uncertain.

Detailed and comprehensive studies of historic resources have occurred recently because of the Banks Lake Resource Management Plan. These are:

- An archeological and historical overview of the upper Grand Coulee (Banks Lake) by Archaeological and Historical Services of Eastern Washington University (Stevens, ed. 1999). The report is a synthesis of the available literature of the span of cultural history for the lands encompassed by the Banks Lake Resource Management Plan.

- An intensive cultural resources survey of Reclamation lands in and around Banks Lake was conducted in 2000 (Hamilton and Hicks 2000) and a follow-up effort in 2002 tested a small number of sites (Hamilton and Hicks 2002). The project recorded 607 historic properties of various kinds and includes those sites recorded or mentioned in the previous investigations noted above, as well as 20 traditional cultural properties (TCPs). Some TCPs are not included in discussions of historic properties due to confidentiality provisions of the ARPA.

An intensive cultural resources survey of the 5-foot drawdown zone, between water surface elevation 1570 feet and elevation 1565 feet of Banks Lake, was conducted during the fall 2002 drawdown as part of this EIS (Engseth 2003). Sixty-six historic properties of various types were identified. In addition, nine traditional cultural properties were identified in this drawdown zone between elevation 1570 feet and 1565 feet.

Two properties on Banks Lake have been either listed or formally determined eligible for listing on a historic register: Salishan Mesa and McEntee's Crossing. Salishan Mesa is a complex of cultural features representing multicomponent prehistoric and historic Indian occupations. The site consists of rock alignments and cairns on and between two small mesas, a small rock shelter on the east side of the larger mesa, and a habitation area with at least one housepit near a spring. The site was determined eligible for listing on the National Register of Historic Places in 1987. McEntee's Crossing is listed on the Washington State Inventory of Historic Places and consists of a historic trail and wagon road in Coulee City.

Prehistoric Sites

Sites attributable to American Indian habitation and use predating Euro-American exploration and settlement are numerous and diverse. They represent a variety of uses related to short- and long-term habitation, resource procurement and processing, and rituals, including large habitations, logistical camps, task-specific sites, talus pits, rockshelters, pictographs, cairns, rock enclosures, and mesa-top occupations. As a collection of properties, these sites document a significant settlement system outside of the Columbia River valley proper. Overall, the diversity of site attributes, such as artifact density, assemblage structure, and features, suggests a complex history of prehistoric use in the coulee. Of the 673 known sites on

Reclamation lands at Banks Lake, there are 262 prehistoric sites and 154 isolated finds. Of this total number of discoveries, 66 have been identified in the area of potential effect for this EIS. Upper Grand Coulee potentially contains sites relevant to the oldest traditions of the Colville Confederated Tribes (CCT). Protection and understanding of these sites is in the interest of the CCT.

Historic Sites

There are 96 sites and 117 isolated finds related to Euro-American settlement recorded on Reclamation lands at Banks Lake. Of this number, three are in the area of potential effect for this EIS. These sites range in age from the last quarter of the 19th century until the filling of Banks Lake, circa 1950. Historic property types include dumps, homesteads, mines, roads, trails, rock alignments and features, and railroad-related property. The most frequently occurring historic property type is refuse dumps.

Multicomponent Properties

This property type incorporates sites yielding evidence of occupations spanning the prehistoric and historic time periods. On Reclamation lands at Banks Lake, 44 sites are multi-component, and, of these, two are in the area of potential effect for this EIS.

Traditional Cultural Properties

A traditional cultural property (TCP) is a site eligible for inclusion in the National Register when it is associated with cultural practices or beliefs of a living community that are rooted in the community's history and are important in maintaining the continuing cultural identity of the community. Investigations for this category of historic properties occurred concurrent with the previous investigations noted above. A number of TCPs were identified in the Banks Lake area; the most obvious and noteworthy is Steamboat Rock, which has frequent references to it in the historical literature as an important legendary site. A recent M.S. thesis by Corey Carmack elucidates the traditional significance of this property (Carmack 2001).

Some TCPs co-occur with archeological sites, while other TCPs are landscape features without an archeological component. A few TCPs are potentially eligible for the National Register. The locations of most TCPs are considered confidential by the ARPA. Nine TCPs were identified in the drawdown zone between elevations 1570 and 1565 feet.

Native American Sacred Sites

Sites that are important to American Indian religions and considered sacred form a separate resource category, which may relate to other resources, including historic resources and Indian Trust Assets, and in some cases natural resources. Executive Order 13007 (May 24, 1996) directs executive branch agencies to accommodate, to the extent practical and not inconsistent with essential agency functions, access to and use of Indian sacred sites by religious practitioners and to avoid adversely affecting the physical integrity of such sites.

During the analysis and data gathering for the Banks Lake RMP, information on sacred sites and related issues was solicited from the Colville Confederated Tribes and Yakama Nation. Steamboat Rock was identified as a site sacred to the Colville Confederated Tribes.

Indian Trust Assets

Indian trust assets (ITAs) are legal interests in property held in trust by the United States for Indian Tribes or individuals. While most ITAs are on-reservation, they may also be found off-reservation. Examples of trust assets include lands, minerals, hunting and fishing rights, and water rights.

The United States has a trust responsibility to protect and maintain rights reserved or granted to Indian Tribes or individuals by treaties, statutes, and executive orders. This responsibility is sometimes further interpreted through court decisions and regulations. This trust responsibility requires that Federal agencies take reasonable actions to protect trust assets when administering programs under their control.

Several American Indian Tribes and bands have interests in this EIS area. Banks Lake from the vicinity of Steamboat Rock southward is in the area ceded in the Yakama Treaty of June 9, 1855. The treaty established the Yakama Reservation and reserved rights and privileges to hunt, fish, and gather roots and berries on open and unclaimed lands to the 14 Tribes and bands who signed that treaty.

The Colville Confederated Tribes, whose reservation was established by Executive Order of April 9, 1872, also considers Banks Lake and surrounding area traditional territory for some of the tribal members of the twelve confederated Tribes and bands on the Colville Reservation.

Sometimes the government and the Tribes disagree on what is considered to be an ITA, and who holds the right. This document neither judges the validity of, nor defines, rights claimed by any Tribal government or member.

While much of the Banks Lake area retains resources that support hunting, fishing, and gathering activities, some areas may have been disturbed to the extent that they no longer can support such traditional uses. Currently, these activities are allowed throughout the study area, except that hunting is not permitted at the existing State Game Reserve and in the State Parks Management Zone.

Environmental Justice

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 of their decisions. 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 of people should bear a disproportionate share of negative impacts from an environmental action. To comply with the environmental justice policy established by the Secretary, all Interior agencies are to identify and evaluate any anticipated effects, direct or indirect, from the proposed action, or decision on minority and low-income populations and communities, including the equity of the distribution of the benefits and risks.

Table 3-10 shows total population and minority data for Grant County, Washington, the project area, and Washington State (U.S. Census Bureau 1990 and 2000). The racial minority population, which includes Black, American Indian/Eskimo/Aleut, Asian/Pacific Islander, and persons of another race, was 14 percent of Grant County's total population in 1990 and 23 percent in 2000, compared to 11 percent and 18 percent, respectively, for Washington State. The Hispanic population, a separate minority ethnic group that can be of any race, was 17 percent of Grant County's total population in 1990 and 30 percent in 2000, compared to 4 percent and 7 percent, respectively, for Washington State.

Table 3-10.—Total population and minority data for Grant County and Washington State

Area	Year	Total	Racial Minority	White	Hispanic
Grant County	1990	54,758	7,782	46,976	9,427
	2000	74,698	17,524	57,174	22,476
Washington State	1990	4,866,692	557,755	4,308,937	214,570
	2000	5,894,121	1,072,298	4,821,823	441,509

In 1998, the estimate of people of all ages in poverty was 15 percent for Grant County, compared to 10 percent for Washington State.

Although current racial and ethnic data are not available, discussions with those familiar with employment in Grant County revealed a majority of the Hispanic population in Grant County is employed in the agricultural and related sectors.

County-level racial and ethnic employment and income data were not available for 2000 at the time the draft EIS was prepared. Racial and ethnic employment and income data for individual businesses in the county were also not available. Population projections by race and ethnicity and projected racial and ethnic employment and income data for the 50-year period of analysis were not available.

Surface Water Quality

Banks Lake was formed by embankment dams on the north and south ends of the upper Grand Coulee in Central Washington. The capacity of the reservoir is 715,000 acre-feet, and it is filled by Columbia River water being pumped from FDR Lake into the feeder Canal by electricity generated at Grand Coulee Dam. Initially, only pumps were installed to lift the water into Banks Lake. Later six pump/generators were installed to pump water into Banks Lake and to generate power if the flow was reversed and water flows from Banks Lake into FDR Lake. Generally, water for irrigation is pumped into Banks Lake and is released through the Bacon Siphon to Billy Clapp Lake on the southern end of the 27-mile long Banks Lake. The average depth of Banks Lake is 41 feet with a maximum depth of 86 feet at full pool water surface elevation of 1570 feet. The maximum width of the lake is 5 miles, but the average width is considerably less than 5 miles. A ridge in the bottom divides the pool into northern and southern pools. The northern pool is cooler, has less stratification and lower transparency, and more plant nutrients than the southern pool. Mixing of water in the northern pool is greater than in the southern pool because of the reversing flow of the pump/generators. The southern pool has higher biomass, and greater stratification and transparency than the northern pool.

Both of the basins within Banks Lake stratify slightly during the summer months; warmer water develops near the surface and mixes downward from solar heating. Cooler water is pumped into the lake from FDR Lake. The cooler water mixes with the slightly warmer upper layers of the lake. This partly mixed lower part of the reservoir is very close to the same temperature below the zone heated by air temperature and the solar radiation. This mixing tends to limit the stratification of the lake in the north basin, so it is less stratified than the southern basin. Neither basin becomes strongly stratified, and solar heating varies almost linearly from the surface to the lower mixed layers, with slightly more heat being accumulated in the near surface than in the deeper parts of the lake. During the fall of the year, the surface of the lake is cooled as the air temperature decreases and the temperature profile becomes nearly uniform as the near surface zone is cooled. However, Banks Lake normally does not mix throughout its depth in most years, and the surface zone can cool until ice forms on the surface during the winter.

Soils around the reservoir are eroded by wind-driven waves and wakes from boats. The most likely eroded soils are predominately very fine sandy loam, silt loam, sandy loam, or fine loamy sand. The above cited areas are predominately the fine, sandy, or loam type soils. These soils are easily suspended by wave action, and are likely washed and graded along the shorelines in these areas. Erosion along the shoreline and sediment from surface runoff has caused muddy or turbid areas in Banks Lake.

According to water quality standards established by the Administrative Code for the State of Washington, Banks Lake falls under the surface water classification of a "Lake classification." Lake classification water bodies should support the following beneficial uses:

- Water supply, which includes domestic, industrial, and agricultural
- Recreation for primary contact, boating, sport fishing, and aesthetic enjoyment
- Commerce and navigation
- Wildlife habitat
- Fish and shellfish migration, rearing, spawning, and harvesting; and clam, mussel, and crayfish rearing, spawning, and harvesting.

Specific numerical or narrative water quality criteria are established for each water body. The irrigation distribution system of the CBP is also classified under this same classification. An oversight group has recently been established as part of a Memorandum of Understanding (MOU) between Reclamation, Washington State, the Environmental Protection Agency (EPA) and the irrigation districts. The group will work to develop water quality criteria and standards appropriate to Banks Lake based on data, water uses, and information assembled by the group.

CBP water quality data have been collected for nearly 40 years, but few if any data have been collected on Banks Lake. Some data exist for the outlet of Banks Lake and the Main Canal at Pinto Ridge (1988-1997), and sparse data on FDR Lake were collected from 1992-1997. A few reservoir samples were taken in September 1998 and in 2001 for Banks Lake. These data were reviewed to assess existing conditions for Banks Lake. Data from the lake were typically in the range of 10 to 20 mg/L for phosphorus, which is below the action level of 35 mg/L set by the State for the Columbia Basin area. Temperature at the surface varied from the mid-70s to the low 80s (°F) during August. The water quality criteria are being reviewed under the current MOU between Reclamation, the Washington Department of Ecology (WDOE), EPA, and the water users. Banks Lake is not listed in the current Section 303d report submitted to EPA nor is any maximum contaminant levels (MCLs) exceeded from the Drinking Water Regulations.

Groundwater Quality

The upper aquifer under Banks Lake is the Wanapum unit with a confining interbed called the Wanapum-Grande Ronde. Below the upper confining layer exists another aquifer called the Grande Ronde. Below these three layers is a bedrock or basement layer. The upper aquifer averages about 400 feet in thickness to the east of Banks Lake, and to the south it varies from a few feet to more than 1,200 feet. The Grande Ronde aquifer is cut off by the basement layer of granite and basalt near Grand Coulee Dam and is about 1,500 feet thick south of the CBP. The average depth of this layer is roughly 1,000 feet under most of the Banks Lake area. Groundwater moves downward near Banks Lake and to the south/ southwest in a horizontal direction from the Columbia River in the Wanapum aquifer. Movement in the Grande Ronde layer is horizontally from the Colombia River in a south/ southwesterly direction and is within the aquifer or upward from the aquifer, because the confining layer forms a basin in the area.

Groundwater in Washington State is reserved and protected for existing and future beneficial uses. Drinking water is one of the most stringent beneficial uses and is used as the criterion to protect the groundwater for all other beneficial uses. The groundwater quality is a function of the source water, precipitation and the Columbia River, the soils and rock in the aquifers, and the geology of the area. Most of the rocks in the area are of volcanic origin or are weathered volcanic soils. The dissolved solids in most of the area are less than 450 mg/L, suitable for most beneficial uses, according to a 1987 U.S. Geological Survey (USGS) report on the groundwater quality in the basalt units of the Columbia River area (Steinkampf 1989). This report indicated that the primary water types found were calcium-magnesium bicarbonate or sodium bicarbonate.

Banks Lake is very near the main source of groundwater, the Columbia River, which has about 1 mg/L of nitrate-nitrogen in it, and little recharge from agriculture is up-gradient to Banks Lake. The groundwater quality around Banks Lake is not affected by irrigated agriculture, but dry land farming in the area and local sources of nitrogen are affecting nitrogen concentrations in the groundwater. About 20 percent of the domestic and water supply wells sampled in the Columbia Basin have nitrate-nitrogen above the 10-mg/L MCL for drinking water. However, in the immediate area of Banks Lake only one set of wells had any nitrate-nitrogen above 10 mg/L. Data from the Washington State Interagency Ground Water Committee (Cook 1996) report only the wells at Coulee City RV Park exceeded the 10-mg/L MCL for nitrate; values of 17.7 and 23.4 mg/L were observed. The source of the contamination is unknown, but poor well design and construction are likely contributors for shallow and uncased wells. All other wells near Banks Lake had nitrogen concentrations ranging from 0.38 to 5.9 mg/L with a mean of 1.9 mg/L. Both the Washington State Interagency Ground Water Committee (Cook 1996) and USGS (Steinkampf 1989) reports indicate that most public water supply wells are from deep wells that are isolated from any surface or shallow sources of nitrogen. These data show that nitrate-nitrogen is not a public health concern at this time.

Some pesticides at very low concentrations have been detected in the groundwater around Banks Lake, but none of them exceeded MCLs established for them.

Visual Quality

The Banks Lake area has spectacular scenery, characterized by the basalt cliffs, headwalls, and talus slopes of the upper Grand Coulee that encompasses most of the study area. The landscape is further enhanced by a vegetative mosaic of shrub-steppe, mesic shrub, upland forest, and riparian/wetland plant communities. There are scenic views and vistas from recreation areas along the lakeshore, from State Route 155 along the eastern shoreline, and from the lake itself. Basalt landforms, such as Steamboat Rock and Castle Rock, are dominant features and focal points for most views in the north half of the study area.

Scenic quality is one of the attributes that attract visitors to the Banks Lake area. As seen from the reservoir or shoreline, the landscape is largely undeveloped and visually appealing in most areas. The dominant visual elements are natural features such as water, basalt cliffs/coulee walls, granitic outcrops, and shrub-steppe plant communities.

While most of the landscape is undeveloped, there is also clear evidence of human activity. Visual intrusions and enhancements include urban/residential areas (Coulee City, Electric City, and Grand Coulee); developed recreation areas; dispersed campsites; an ORV area; highways, primary/secondary roads and jeep trails; an airport; gravel/material sites; electric transmission lines; residential subdivisions; and some agricultural lands. This combination of natural elements and cultural modifications provides a pleasing visual setting to most visitors.

Impacts from dispersed recreation, especially dispersed camping and motor vehicle travel, are readily apparent in some areas. Localized impacts in the form of braided, unauthorized "two-track" secondary roads are common, and soil erosion from rutting and gullying due to wet season travel is prevalent in some areas.

Irrigated and dry land agriculture dominates the landscape in the upland areas located above the reservoir's coulee headwalls. This landscape has relatively open, uninterrupted views, with dry land and irrigated wheat fields and stubble the most prominent features. Adjacent to the reservoir, Coulee City and Electric City have traditional rural townscapes surrounded by newer suburban development patterns. Agricultural, rural residential areas, and developed recreation areas are considered visual enhancements by most viewers, whereas jeep trails, gravel/material sites, and electric transmission lines are generally considered visual intrusions.

From about 3 miles north of Coulee City, a northbound traveler on State Route 155 will see a semiprimitive, natural appearing landscape enclosed primarily within the basalt walls of the upper Grand Coulee. From this point to Steamboat Rock State Park, there are two recreation viewpoints and few cultural modifications.

Views from Dry Falls Dam located near the southern end of the study area include some distracting elements, including highways, a braided network of unpaved roads and jeep trails, electric transmission lines, breakwater structures and marinas, and other developed recreation facilities that detract from the surrounding rural landscape.

Scenic Quality Ratings—The Bureau of Land Management's (BLM) visual resource management system was used to classify the area's visual resources. To rate visual quality, the study area was divided into 13 scenic quality units based on physiographic characteristics such as landform and vegetation. The scenic quality of each unit then was evaluated for seven key factors—landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications—and given a numeric value. These values were totaled to determine the unit's scenic quality class.

Table 3-11 presents the results of the scenic evaluation. Five units were rated "A" because they clearly possessed "distinctive" landscapes and high scenic quality. Of these, the Middle Banks Lake and Upper Banks Lake units received the highest rating, because they are the most primitive and naturally appearing. Of the remaining units, five were rated "B"—"common" landscapes with a variety of interesting visual features, and three were rated "C"— "minimal" landscape beauty. The "C" units had the highest concentration of cultural modifications and visual intrusions present because they are within rural/residential areas or incorporated city landscapes.

Table 3-11.—Scenic quality ratings, Banks Lake, Washington

Rating unit	Scenic quality rating
Dry Falls Dam	B
Coulee City	C
South Banks Lake 2	C
South Banks Lake 1	B
Middle Banks Lake	A
Upper Banks Lake	A
Steamboat Rock	A
Barker Flat	A
Old Devil's Lake	A
Kruk's/Jones Bay	B
North Banks Lake	B
Osborn Bay	B
North Dam	C

Air Quality

The Banks Lake study area is under the jurisdiction of WDOE's Eastern Regional Air Pollution Control Authority Office. Washington's air monitoring network measures ambient air quality near population centers in selected areas of the State.

The closest monitoring sites to Banks Lake are Spokane to the east and Yakima to the southwest.

Due to the absence of nearby point sources, such as commercial and/or industrial facilities, air quality is high and exceeds the National Ambient Air Quality Standards and criteria.

Soils

Soils in the study area consist of three general soil groups and a total of five general soil map units in Grant County, and three general soil map units in Douglas County. Each of the general soil map units identifies broad areas that have a distinctive pattern of soils, relief, drainage, and landscape. The Grant and Douglas County soil surveys rate suitability for recreation, wildlife habitat, and building site development for each of the 51 soil map units found in the study area (USDA 1984 and USDA 1981).

Soils that pose the most severe risk of erosion are essentially silt loams. Some of these are covered by a mantle of loess and/or subject to periodic flooding. Where these soil types occur, they are excessively slick and easily disturbed by vehicles when wet and become easily airborne when dry. These soil types cover a substantial portion of the study area and often include the same land areas currently used for developed recreation. Where soil compaction accelerates the velocity and volume of surface runoff, the extent and magnitude that soil erosion can occur are increased.

Shorelines erode continually at Banks Lake. Issues of particular concern include the continued loss of riparian vegetation (e.g., black cottonwoods) used as roosting sites by bald eagles and other raptors, and shoreline encroachment on public lands and facilities. Land use activities (e.g., livestock grazing, dispersed recreation, and motor vehicle travel) have accentuated erosion. Other factors that contribute to shoreline erosion include large wakes from boats or wind during high water. The lacustrine soils found along the reservoir shoreline are particularly prone to erosion (Harris 1998). Erosion is prominent along the west shore of the Steamboat Rock peninsula; north and south of the Million Dollar Mile North Boat Launch; south of the Million Dollar Mile South Boat Launch; Barker Flat; and Electric City Community Park (Coulee Playland).

Social Environment and Public Health

A description of the location, population, income, and employment of the affected area appears in the economics section of this EIS. A description of the minority and low-income population is included in the environmental justice section of the EIS. Social values are identified here, as well as a description of the mosquitoes environment.

Social Environment

Comments heard at the public scoping meeting and received in written comments reflect the social values of those directly or indirectly associated with Banks Lake. Different individuals and groups have their own views of Banks Lake, which reflect their social values, such as viewing the lake as an integral part of their business and local economy, a place for water-based recreation, a storage facility for irrigation water and/or power production, or a source of water to help anadromous fish. Many individuals expressed concern that negative impacts to their local communities associated with any drawdown would be greater than positive benefits to anadromous fish elsewhere. Others countered that providing increased water for endangered salmon runs would outweigh any negative impacts to everything else.

The social values of these individuals and groups have likely changed over time. It is probable they will continue to change during the 50-year period of analysis. However, it is not possible or appropriate to predict how they will change.

Public Health—Mosquitoes

Mosquitoes belong to the insect order *Diptera*. Mosquito mouthparts form a long piercing-sucking proboscis with which females obtain a blood meal needed for egg production. Nectar is the main food source for male mosquitoes. Four distinct stages make up the life cycle of the mosquito: egg, larva, pupa, and adult. Larval and pupal stages are typically aquatic. Biting mosquitoes can become a serious nuisance to people recreating in areas with nearby mosquito populations. They may also be a health concern where transmission of disease agents, which are often maintained in bird populations, from mosquitoes to humans occurs.

Successful disease transmission requires several generations to increase the size of the adult mosquito population and amplify the virus within the bird population (e.g., Madder et al. 1983), which then will increase the likelihood of transmission to humans. Optimal conditions for development of high densities of adult mosquitoes are large water surfaces and long periods of time (Tadzhieva et al. 1979). Timing of availability of breeding areas is likely important and Madder et al. (1983) found that *Culex pipiens* and *Cx. restuans* egg production declined in late summer. Length of time that mosquito production areas are available is also critical. Minimum mean time for embryonic, larval, plus pupal development time (*Culex* species) was about 8 days at a high temperature of 86 ^{o}F (30 ^{o}C) (Madder et al. 1983). The Washington State Department of Health (2002) suggests that water that stands for greater than 10 days is needed for production of *Culex tarsalis*. In a study by Williams et al., (1993) it took about 2 days for first instar larvae to appear in newly filled pool areas.

The association of dams with mosquito and human health problems has been recognized (WHO 2000) and the Tennessee Valley Authority (TVA) early on made recommendations for limiting mosquito production in impoundments (Cooney 1976). Cooney (1976) listed a number of measures to help control mosquitoes in TVA facilities: (1) monitoring of mosquito populations; (2) the application of approved insecticides when levels reach a nuisance threshold; (3) implementation of an effective water-level management scheme; (4) maintenance of effective internal drainage; (5) control of marginal vegetation; and (6) operation of dewatering projects for mosquito control. Gartrell et al. (1972) suggested that dewatering areas controls mosquito production in the spring and summer. Water level management destroys mosquito eggs and larvae by stranding them onshore or drawing them into open water where they are exposed to predators (Snow 1956). Reservoir drawdowns during the summer and fall of at least 20 feet were effective in providing mosquito control in TVA reservoirs (Hess and Kiker 1943) by decreasing marginal vegetation. Mosquito production is often highest in shallow, stagnant waters with dense, emergent vegetation. Wind-swept shorelines lacking vegetation and pools containing fish and other mosquito larvivores are not conducive to mosquito production (e.g., Pratt and Moore 1993).

Mosquito-Borne Disease

Several arthropod-borne viruses associated with mosquitoes are found in Washington State. The Washington State Department of Health (2002) lists western equine encephalitis and St. Louis encephalitis as being diseases relevant to Washington State. Both of these viruses are maintained in a mosquito-bird-mosquito cycle and *Culex tarsalis* is a principal vector. These traits are shared to a great degree with the newly emergent (in the Western hemisphere) West Nile Virus (WNV).

History, Origin, and Status of West Nile Virus

West Nile Virus is a typically mosquito-borne virus indigenous to Africa, Asia, Europe, and Australia (Campbell et al. 2002). West Nile Virus was recently introduced to North America and first detected in 1999 in New York City. The virus spread across the United States by 2002 (CDC 2002). The virus is maintained in nature in a mosquito-bird-mosquito transmission cycle primarily involving *Culex* spp. mosquitoes (CDC 2002). A large number of birds can become infected with WNV. Most survive (http://www.cdc.gov/ncidod/dvbid/westnile/birds&mammals.htm), with highest mortality rates in passerines as shown in a laboratory study (Komar et al. 2003). Members of the crow family (*Corvideae*) are the most susceptible to death from WNV (Crane 2003).

In the United States, most human infections with WNV occur in summer or early fall (Campbell et al. 2002) and coincide with high abundance of adult *Culex* mosquitoes (Kulasekera et al. 2001). Mosquito feeding preferences can increase or decrease the potential of mosquitoes for transmitting the virus to humans. Opportunistic feeders that feed on both mammals and birds are best for bridging WNV from birds to humans and other mammals. Goddard et al. (2002) suggested that a suite of *Culex* species is important for maintaining and bridging WNV in wetland ecosystems in California. Transmission of WNV is most intense when initially arriving in a geographic area. West Nile Virus will decline to a lower level after susceptible wild birds have either died or recovered and developed immunity to reinfection. Transmission of WNV to humans requires a reservoir of infected, viremic animals (mostly birds) from which mosquitoes carry the virus to people (Crane 2003).

To prevent WNV infection in humans, extensive early season larval control has been recommended (CDC 2001). This prevents the build-up of mosquito populations.

Chapter 4

Environmental Consequences

This chapter will compare the No Action (preferred alternative) conditions of the resources with the impact of Reclamation's Action Alternative. The resources evaluated are vegetation, fish, wildlife, threatened and endangered species, economics, recreation, irrigated agriculture, historic resources, traditional cultural properties, Indian trust assets, environmental justice, surface water quality, groundwater quality, Native American sacred sites, visual quality, air quality, soils, and safety, health, social environment, and public health. Another section in Vegetation, Fish, and Wildlife addresses concerns about FDR Lake biota.

Vegetation, Fish, and Wildlife

The littoral zone is important for many species of fish, supporting both juvenile and adult life stages. This zone supports aquatic emergent and submergent plants (aquatic macrophytes) that provide important food sources and nesting habitat for a wide variety of waterfowl, shorebird, mammal, and amphibian species. The fringe of riparian vegetation species that line the edge of the reservoir also provides crucial habitat for a wide variety of wildlife species.

The key to determining the magnitude and extent of impacts to the littoral zone is the time of year and the length of time the reservoir is drawn down, and the extent of drawdown that exposes the littoral zone to dessication. Therefore, the focus of this analysis centers on this narrow, but crucial, zone of the reservoir. Weather patterns during the drawdown would influence the degree of impact. If the period from August 1 to September 22 is cool and rainy, substrates would not dry out as fast or as deeply as they would if this period were hot and dry. Ten-year average monthly rainfall for Grant County is 0.34 inches for August and 0.21 inches for September (Quall et al. 2003). Ten-year average monthly high temperature for Grant County is 84.21 °F for August and 78.53 °F for September; while average monthly low temperature is 56.87 °F for August and 49.92 °F for September. Also, the type of substrate determines how much soil moisture is held. Clay and organic matter dry out more slowly than sand and loam.

Most aquatic macrophytes in the Banks Lake littoral zone occur in a band from water surface elevation 1569 feet to 1566 feet. The number of days that the littoral zone would be exposed during drawdown is determined from the number of days the reservoir is at or below elevation 1566 feet. The maximum amount of drawdown below the aquatic macrophytes zone that occurs under the No Action Alternative is 1 foot, and the length of time the aquatic macrophytes zone is exposed (dewatered) under the No Action Alternative ranges from approximately 6 days to 36 days. The maximum amount of draft below the aquatic macrophytes zone under the Action Alternative is 6 feet, and the length of time the aquatic macrophytes zone is exposed ranges from approximately 23 days to 43 days (see table 4-1)

Table 4-1.—Number of days aquatic macrophytes are exposed during drawdown. Aquatic macrophytes generally occur in Banks Lake from elevation 1569 feet to 1566 feet

Scenario	No Action Alternative Number of days exposed 1 foot	Action Alternative Number days exposed 1 to 6 feet
Low water	36	43
Early draft	26	34
Uniform draft	10	29
Late draft	6	23

FDR Lake Plant and Animal Life

The impacts analyzed in this EIS were specifically limited to those that would occur directly to the Banks Lake biota. However, this section addresses concerns about the biota in FDR Lake.

The total storage capacity of FDR Lake is approximately 9.7 million acre-feet, of which about 5.2 million acre-feet constitutes active storage capacity. The Action Alternative would result in an additional 127,000 acre-feet being released from Grand Coulee Dam for augmentation flows (instead of pumped to Banks Lake) for a period ranging from August 1 to September 1, depending on the drawdown scenario (Low Water, Early Draft, Uniform Draft, or Late Draft). The Action Alternative calls for refill (pumping from FDR Lake to Banks Lake) to occur from September 1 to September 22. The 260,000 acre-feet (10 feet in Banks Lake) represents 0.03 percent of the total volume of FDR Lake. This is equivalent to about 1 ½ feet in FDR Lake (or an additional ¾ foot above the No Action Alternative operations). However, because there is an end-of-September target elevation of 1283 feet, refilling Banks Lake would result in reduced releases downstream from Grand Coulee Dam instead of lower water surface elevations in FDR Lake. Additional details on the operations of the pumping plant, as well as the Left Powerhouse, Right Powerhouse, and Third Powerhouse are described in detail in the Economics section of the EIS.

Also, Grand Coulee Dam serves as primary storage for the entire Columbia River (outside Canada), with approximately 9.7 million acre-feet of storage, 5.2 million-acre feet as active storage capacity. It, along with Chief Joseph Dam downstream, generates

50 percent of the power used in the Pacific Northwest. Ninety-five percent of the peaking capacity (providing power during peak use periods) resides at Grand Coulee and Chief Joseph Dams for the Pacific Northwest. As such, flows through Grand Coulee Dam fluctuate greatly. Additional factors influencing how Grand Coulee is operated includes the Biological Opinion issued by NMFS in 2000. Other factors that influence releases at Grand Coulee include the power market, Treaty, and Non-Treaty storage managed by BPA, as well as recreation, fish, and wildlife values managed for FDR Lake. The additional 127,000 acre-feet of water is passed downstream and would result in no net change in water surface in FDR Lake in August. Water residence times would not be affected as total combined outflows from FDR Lake would not change. Water previously pumped from FDR Lake to Banks Lake would now be released through the turbines, increasing downstream flows by up to 7,000 cfs.

Entrainment of fish, particularly kokanee and rainbow trout, through the turbines at Grand Coulee has been identified as a major limiting factor for maintaining these fisheries. Entrainment through the Third Powerhouse is significant. Recent research using strobe lights to reduce entrainment (Perry et al. 2003, Johnson et al. 2003, LeCaire 1999) indicates that the entrainment rate is proportional to flow through the turbines. Entrainment also varies by season with some of the highest entrainment rates occurring during August. In theory, it is reasonable to conclude that increasing flows through the Third powerhouse during the August Banks Lake drawdown would result in higher entrainment rates of fish, including kokanee and rainbow trout. However, given the large volumes of water and the extreme fluctuations, the relative contribution of Banks Lake drawdown water is extremely small. For example, flows at Grand Coulee Dam during August 2003 regularly fluctuated between approximately 60,000 cfs and 110,000 cfs (see the Hydromet station at www.usbr.gov/pn/hydromet/graphs/gcl_qd_wy.html). Reclamation, therefore, concludes that no appreciable changes would occur to the biota of FDR Lake, including resident fish, or to the biota of the Columbia River immediately downstream of Grand Coulee Dam.

Vegetation

Riparian plant species and many aquatic macrophyte plant species in the semi-arid and arid portions of the West, where water availability from rain and snowmelt are limited and sporadic, are adapted to drawing much of their seasonal water needs from groundwater (Stromberg 1994; Rood and Mahoney 1990). Any significant changes in the normal range and seasonal patterns of fluctuation of the groundwater table would be expected to have adverse effects on these species. Mortality or even stress in these species would lead to changes in vegetation community composition. Any significant change in water table elevation during the growing season can potentially adversely affect these communities (Stromberg 1992).

Many species of riparian vegetation, especially cottonwood, have very specific soil moisture requirements needed for germination. These requirements typically involve early spring high water levels that recede at just prior to seed fall providing a moist seedbed. Alteration of the timing or magnitude of these events increases the probability that recruitment would be adversely affected (Bradley and Smith 1986; Stromberg 1992). Significant modification either to the groundwater table, which supports established vegetation, or the hydrologic conditions, which create conditions suitable for successful recruitment, may cause long-term effects to susceptible littoral zone riparian and aquatic macrophyte vegetation communities.

Drought tolerance of aquatic macrophytes species and the length of time that roots are exposed to drying conditions are factors used to determine the ability of plants to survive drawdowns. Another factor that affects plant survival is the weather during the drawdown. Hot, dry weather would dry out substrates faster than cool, wet weather. The growing season is nearing its end in August; therefore, decreasing adverse impacts that might occur if drawdown occurred earlier in the growing season. The substrate type (soil composition) determines how fast groundwater would recede from soils in beds of aquatic macrophytes and, therefore, determines how fast the substrate would dry out during drawdown. Soils high in clay content or high in organic matter retain moisture longer through capillary action. Soils that are mostly sandy drain and dry out rapidly.

The following soil types are based on Grant County and Douglas County soil surveys. Loam, very fine sandy loam, silt loam, sandy loam, fine sand, and loamy sand generally occur near the Million Dollar Mile North Boat Launch; west of the coulee wall in Section 2 of T.25N./R.28E. and in Section 35 of T.26N./R.28E.; on the south half of the Steamboat Rock State Park peninsula; at the Steamboat Rock Rest Area and Boat Launch; most of the Barker Flat area; and most of the upper reservoir area north of Kruks Bay. Soils with gravelly loam, stony loam, and cobbly loam generally occur in the south/southeast portion of the reservoir area near Dry Falls Dam. Soils subject to seasonal flooding, and soils that are poorly drained, very cobbly, or that consist of rock outcrop are found predominantly in the Northrup Canyon, Steamboat Rock, Barker Cove, Old Devil's Lake, and Lovers Lane areas. Little site-specific data on soil composition exist for the Banks Lake littoral zone, increasing the uncertainty for any analysis of impacts.

There are two measures of impact to vegetation following exposure to desiccation during drawdown: (1) the distribution, abundance, and species composition of aquatic macrophytes in the Banks Lake littoral zone and (2) the distribution, abundance, and species composition of riparian vegetation. The analysis is accomplished by examining the potential impacts to representative plant species that are combined to provide an overall impact assessment for each vegetative community.

No Action Alternative

Distribution, Abundance, and Species Composition of Aquatic Macrophytes.— Depending on the scenario, the number of days the littoral zone is exposed during drawdown ranges from approximately 6 to 36 days. Drawdown would be limited to elevation 1565 feet. The present well-developed stands of aquatic macrophytes would likely continue relatively unchanged. Reed canarygrass, an invasive exotic species, would continue to spread, although its rate of spread is difficult to predict. Eurasian water milfoil, also an invasive exotic, has spread extensively in the past, requiring extensive winter drawdowns to kill it. Though the present extent is relatively low, this species would likely continue to grow and spread.

Distribution, Abundance, and Species Composition of Riparian Vegetation.—The species composition and abundance of riparian vegetation species is likely to continue to exist in a similar manner for the 50-year life of the project.

Action Alternative

Distribution, Abundance, and Species Composition of Aquatic Macrophytes.—Depending on the scenario, the number of days the littoral zone is exposed ranges from approximately 23 days to 43 days. Drawdown would extend to elevation 1560 feet—up to 6 feet below the current lake elevation fluctuation. Drought-tolerant species, including Nebraska sedge, beaked sedge, hardstem bulrush, baltic rush, and common spikerush, are unlikely to be adversely affected. Common cattail and narrow-leaved cattail are likely to increase in density as summer drawdowns stimulate germination of seeds (Sojda 1993). Reed canarygrass is also likely to increase in density, as this is a hardy, drought-tolerant, highly invasive species, particularly in wetland situations (Schmierer 2000). American bulrush, softstem bulrush, redtop bentgrass, lesser duckweed, and sago pondweed are drought intolerant and are likely to be reduced in distribution and abundance. The Eurasian water milfoil is unlikely to be adversely affected, as this species requires exposure of the roots to freezing temperatures. The lake levels would return to full pool prior to the onset of cold weather.

Stands of aquatic macrophytes are likely to continue to persist in the littoral zone of Banks Lake under the Action Alternative in a similar extent as occurs at present. These stands would likely consist mostly of reed canarygrass and Baltic rush. These two species are currently the dominant aquatic macrophyte species at Banks Lake. They are drought tolerant and are unlikely to be adversely impacted by August drawdowns. Nebraska sedge, beaked sedge, hardstem bulrush, and common spikerush, as well as other drought-tolerant species, would also persist in these stands. Though it is difficult to predict with absolute certainty, it is likely that cattails would become denser, as well as stands of reed canarygrass. Major adverse impacts that are likely to occur are the reduction or elimination of drought-intolerant species, such as American bulrush, softstem bulrush, redtop bentgrass, lesser duckweed, and sago pondweed, thus reducing the overall species diversity. It is very likely that other plant species would grow in the drawdown zone during the August drawdown. Seasonal drawdowns are the primary method that wildlife managers use to promote the growth of plants favorable for waterfowl in the drawdown zone. Table 4-2 provides a summary of impacts to representative species of aquatic macrophytes that occur in the study zone.

Distribution, Abundance, and Species Composition of Riparian Vegetation.—The primary source of impact to the thin strip of riparian vegetation along the shoreline is the amount of drying that occurs to the substrates during drawdown and the ability of each species to tolerate soil drying. The present distribution and species composition of the thin strip of riparian vegetation above the high water line at elevation 1570 feet has developed and persisted under a water level regime that centers on fairly consistent elevations from 1568 feet to 1566 feet for most of the growing season.

Groundwater levels recede both vertically and horizontally much more quickly in sandy and cobbly soils than in soils containing loam, clay, or organic material. A rough rule of thumb for the rate that groundwater recedes in the most well drained soils is 2.5 feet per month in vertical elevation and 10.4 feet per month in horizontal distance. At the other extreme, soils with high clay content can seal off at the surface and retain high soil moisture levels for extended periods of time. The clay and organic matter content of the soils beneath the riparian vegetation community at Banks Lake has not been characterized other than by the broad county soils maps, as discussed earlier. Therefore, some uncertainty exists regarding the response of riparian species to drawdowns. An additional source of uncertainty is the weather conditions that would be encountered in August and September during drawdowns. Therefore, a range of impacts is discussed.

In general, for mature, established riparian species, soil moisture should remain adequate for all soil types, even for low drought-tolerant species, such as the few mature black cottonwood trees that remain. However, seedlings of low-drought-tolerant species, such as black cottonwood and peachleaf willow with shallow root systems, may become stressed or eliminated if they have established on sandy, well-drained soils. The Low Water Scenario has 43 days of exposure and may result in the greatest adverse impact. Other species have a range of drought tolerance from low to high, such as coyote willow and Wood's rose. Some individuals of these species may be reduced or stressed, depending on the substrate. Stands of Russian olive may increase, as this species is drought tolerant and rapidly colonizes riparian areas.

Summary of Impacts.**—**Table 4-2 summarizes the impacts to aquatic macrophytes species in the Banks Lake littoral zone, and Table 4-3 summarizes the impacts to the thin strip of riparian species along the shoreline.

Table 4-2.—Summary of impacts to aquatic macrophyte species in the Banks Lake littoral zone

Species	No Action	Action Alternative
Nebraska sedge	No impact. Would continue to exist in subdominant stands in protected bays and shorelines. Prefers saturated soils early in the season, but later dry out—ideal conditions provided by No Action.	No impact. August drawdown provides ideal conditions. Distribution and abundance likely to remain the same.
Beaked sedge	No impact. Tolerates extreme water level fluctuations.	No impact; however, shoot size may be reduced.
Hardstem bulrush	No impact. Can tolerate several years of dry conditions.	No impact. Distribution and abundance likely to remain the same.
Baltic rush	No impact. Drought-tolerant, dominant stands in protected bays. Distribution and abundance would remain stable.	No impact. Distribution and abundance likely to remain the same.
Common spikerush	No impact. Prefers saturated soils in early season that dry up in summer.	No impact.
Eurasian water milfoil	No impact. Requires exposure during freezing temperatures to kill plant. Unlikely to occur in August or September.	No impact.
Common cattail	No impact. Drought tolerant.	No impact to beneficial impact. Drawdowns stimulate germination of seeds. Stands may become denser.
Narrow-leaved cattail	No impact. Drought tolerant.	No impact to beneficial impact if drawdowns stimulate seed germination.
Reed canarygrass	No impact. Drought tolerant. Dominant stands in protected bays. Distribution and abundance increasing.	No impact. Highly invasive species in wetlands.
American bulrush	No impact. The very slight 5 feet fluctuations allow this species to persist.	Adverse impact. Drawdowns likely to reduce or eliminate species, as it requires saturated soils.
Softstem bulrush	No impact. Present distribution and abundance likely to remain unchanged.	Adverse impact. Present distribution and abundance likely to be reduced.
Redtop bentgrass	No impact. Present distribution and abundance likely to remain unchanged.	Adverse impact. May be reduced or eliminated in soil areas that dry out completely.
Lesser duckweed	No impact. Present distribution and abundance likely to remain unchanged.	Adverse impact. Would likely be reduced, regardless of soil composition.
Sago pondweed	No impact. Present distribution and abundance likely to remain unchanged.	Adverse impact. Would likely be reduced, regardless of soil composition.

[1/] Facultative species can occur in either uplands or wetlands.

Table 4-3.—Summary of impacts to riparian species present in the Banks Lake littoral zone.

Species	No Action	Action Alternative
Black cottonwood	No impact. Riparian species tolerates drought conditions when established. Present distribution and abundance likely to remain unchanged.	Low impact to mature trees. Moderate impact to seedlings particularly in the Low Water and Early Draft Scenarios. Mature trees can store water in trunk, but seedlings and young plants may be reduced if soils, particularly in sandy areas, are dried out.
Russian olive	No impact. Riparian exotic species, high drought tolerance. Present distribution and abundance likely to increase.	No impact to beneficial impact. Stands of Russian olive may increase because it can rapidly colonize riparian areas.
Peachleaf willow	No impact. Facultative wetland species located on transitional riparian sites. Likely to persist where it currently exists.	Low drought tolerance. May be reduced in areas with well drained or sandy soils.
Coyote willow	Obligate wetland species that occurs in transitional riparian areas. Likely to persist where it currently exists.	Drought tolerance ranges from low to medium. May be reduced or stressed, particularly in the Low Water and Early Draft Scenarios.
Red-osier dogwood	Facultative[1/] species with medium drought tolerance. Likely to persist where it currently exists.	May decrease in areas with well drained sandy soils, particularly in the Low Water and Early Draft Scenarios.
Wood's rose	Drought tolerance ranges from low to high. Likely to persist where it currently exists.	Some drought-intolerant individuals may be reduced.

[1/] Facultative species can occur in either uplands or wetlands.

Fish

One of the major concerns of the proposed action is the potential to reduce or eliminate the aquatic macrophytes that serve as critical spawning and nursery habitat for the majority of Banks Lake fish species. Fish species that spawn in littoral areas can be adversely affected by water level fluctuations. Drawdowns can result in habitat loss and mortality to eggs and young after exposure or suffocation by eroded sediments (Hassler 1970). Drawdowns can also affect water temperatures, increase predation, and decrease food availability. Rapidly receding waters may also cause nest desertion, poor egg survival, and disrupted spawning for species, such as largemouth bass, yellow perch, and common carp that spawn in shallow water. Low and variable spring water levels can adversely affect the spawning success of species, such as yellow perch (Walburg 1976). Conversely, rising or high water levels during the spawning season, and for several months afterward, enhance postspawning survival by inundating shoreline vegetation that provides refugia and abundant food for young-of-year fish (Ploskey 1986).

Another concern is the exposure of juvenile fish to increased predation. Juveniles of many species move offshore during late summer and would not be affected by the dewatering of aquatic macrophytes or other littoral zone cover. Other species, however, rely on the cover of aquatic macrophytes year round and would thus be affected. The degree of impact to fish populations would depend on the length of time water levels are drawn down.

Water level fluctuations can alter predator-prey relations by reducing habitat complexity and the overall amount of habitat available. Drawdowns may force small fish to abandon complex habitat in littoral areas, serving as refugias and increase their vulnerability to predation (Jenkins 1970). Piscivores, such as walleye and trout, on the other hand, often increase in weight by feeding heavily on the concentrated prey. Water level drops would force juvenile and small fish out of the cover of aquatic macrophytes, as well as other cover, such as logs, brush, boulders, and cobbles, increasing their susceptibility to predation.

To determine the environmental consequences to fish habitat and fish populations, the following indicators were analyzed for the No Action and Action Alternatives.

- Quality and quantity of spawning and nursery habitat in shallow aquatic macrophytes; shallow unvegetated flats; and boulders, cobble, gravel.

- Ability of juvenile fish to withstand predation pressure during drawdown.

- Quality and quantity of aquatic food base.

No Action Alternative

Quality and Quantity of Spawning and Nursery Habitat.—The well-developed stands of aquatic macrophytes would continue to provide suitable spawning and nursery habitat for fish. Shallow, unvegetated flats would also be abundant, as well as boulders, cobble, and gravel habitats.

Susceptibility of Juvenile Fish to Predation.—Reservoir water levels would remain at or above elevation 1565 feet through August, keeping some aquatic macrophytes available to juvenile fish for cover and protection from predation. The present level of predation on juvenile fish would likely continue, and fish populations would not change from the present condition.

Quality and Quantity of Aquatic Food Base.—Stable water levels would allow continued production of benthic invertebrates.

Fish Nets at Dry Falls Dam.—Lowering the water surface causes accelerated wear to the bottom of the fish nets as more of the nets contact the bottom and wave movement of the floats causes abrasion on the net bottom.

Action Alternative

Quantity and Quality of Spawning and Nursery Habitat.—Spawning and nursery habitat can be found in aquatic macrophytes, shallow, unvegetated flats, and boulders, cobble, and gravel.

Aquatic Macrophytes.—The basic question to be answered is whether a drawdown to water surface elevation 1560 feet during August and a refill starting September 1 to elevation 1570 feet by September 22 would adversely impact stands of aquatic macrophytes that currently provide spawning and rearing habitat for at least 10 fish species in Banks Lake. August drawdowns are unlikely to adversely impact drought-tolerant aquatic macrophyte species which include the two most dominant species at Banks Lake—Baltic rush and reed canarygrass. Other drought tolerant species present at Banks Lake that would not be adversely impacted include Nebraska sedge, beaked sedge, hardstem bulrush, common spikerush, common cattail, and narrow-leaved cattail. All of these species would continue to be present in the existing stands of aquatic macrophytes along shallow protected bays and shorelines. These stands of aquatic plants would continue to be available to fish during the spring spawning and early larval rearing period. Drought-intolerant species, such as American bulrush, softstem bulrush, redtop bentgrass, lesser duckweed, and sago pondweed would likely be reduced in distribution and abundance in these stands. The basic conclusion is that the present extensive stands of aquatic vegetation would persist in the face of August drawdowns, but the species composition of those stands may change. Drought-tolerant plant species would continue to provide substrate for algae, for aquatic macroinvertebrate production for food; and cover for eggs and juvenile fish from predators.

Shallow, Unvegetated Flats.—The North Banks Lake and South Banks Lake maps (figures 3-2 and 3-3) highlight the proposed 5-foot drawdown zone to elevation 1560 feet (light green). The wider the space between contour intervals, the lower the gradient becomes. Extremely wide areas can be seen adjacent to Barker Flat, on the west and south shores of the Steamboat Rock State Park, and along the Million Dollar Mile, as well as along the southwest portion of the lake in the game refuge. These are mostly unvegetated flats. The primary value of these areas is that they are shallow. The proposed 5-foot drawdown may force fish species into deeper habitats with potentially increased risk of predation. However, due to the gradients of the shoreline, shallow areas temporarily lost as a result of the drawdown would be replaced by a similar amount of new shallow habitat.

There are some areas that may become vulnerable to substrate erosion. This can be seen on the map as the zone where a sharp dropoff occurs—shoreline areas out from the Million Dollar Mile South Boat ramp and Chase Draw to the south, as well as the south end of Steamboat Rock State Park. Erosion that occurs here may eliminate fine sediments, leaving more exposed boulders and cobble, which would not erode. This may increase interstitial spaces for small fish cover.

Boulders, Cobble, Gravel.—This habitat type is typically found throughout much of the shoreline of Banks Lake, particularly in areas exposed to greater amounts of wind and wave action. It is unlikely that any erosion caused by declining water levels would change the composition of this substrate, except to remove some fine sediment.

Ability of Juvenile Fish to Withstand Predation during Drawdown.—Eight species of fish in Banks Lake have juveniles present in stands of aquatic macrophytes during August. These species include yellow bullhead, largemouth bass, pumpkinseed, longnose sucker, largescale sucker, bridgelip sucker, prickly sculpin, and northern pikeminnow. Juveniles of these species would be forced out of the protective cover of aquatic macrophytes and would be exposed to increased risk of predation. The amount of adverse impact on these species would depend on the length of time exposed to increased predation. The greatest impact would occur during the Low Water scenario, resulting in 43 days of littoral zone exposure, during which time increased predation could occur. Predation pressure may be offset somewhat in species that have rapidly growing, fairly large young. Largemouth bass juveniles tend to be larger by late summer (2 to 5 inches) than other species. Their larger size may enable some to escape predators better than smaller individuals. Rainbow trout and kokanee are stocked at a larger size to avoid predation.

Ten species of fish have juveniles that are not present in aquatic macrophytes or other shallow water habitats during August; therefore, changes in water levels would not affect their susceptibility to predation. These species include channel catfish, brown bullhead, smallmouth bass, black crappie, walleye, yellow perch, lake whitefish, mountain whitefish, peamouth chub, and common carp. Bluegills are able to withstand extreme water level fluctuations. Rainbow trout and kokanee are unable to naturally reproduce in Banks Lake and are stocked at larger sizes to prevent predation.

- *Ictaluridae.*—Juvenile channel catfish are not dependent on vegetation for cover but rely on turbid water to avoid predation. At water surface elevation 1560 feet, shallow, turbid water would still be available along much of the western shoreline and in bays such as Osborn, Kruk's, Jones, and Airport, as well as in the Devil's Punch Bowl and Barker Cove (see figures 3-6). Therefore, increased predation on juvenile channel catfish would not result under the Action Alternative. Brown bullhead juveniles disperse to deeper water in the fall and should not experience elevated predation rates.

- *Centrarchidae.*—Juvenile largemouth bass cruise the shorelines as they mature but still require the cover of logs, brush, and vegetation for protection from predation. Drawdowns may force juveniles out of the protective cover of aquatic macrophytes, increasing predation risk temporarily. Smallmouth bass juveniles are dispersed in deeper water by summer and should experience little increase in predation.

- *Percidae.*—By late summer, juvenile walleye move toward the lake bottom in 10 to 30 feet of water. There would be little increase in predation as a result of drawdown. Yellow perch juveniles move into deeper water by mid- to late summer but could be exposed to increased predation for 23 to 43 days, depending on the drawdown scenario.

- *Salmonidae*.—The young of mountain whitefish move offshore in summer and should experience no increase in predation risk. Rainbow trout are stocked at a size large enough to avoid most predation.

- *Cyprinidae*.—Young common carp move into deeper water in late summer and would experience little increase in predation risk. However, young northern pikeminnows are found in shallow vegetation and would be exposed to increased predation.

- *Catostomidae*.—The young longnose suckers, large-scale suckers, and bridgelip suckers remain in shallow, weedy areas of lake shores and would likely be subjected to increased predation during drawdown.

- *Cottidae*.—Young prickly sculpin occupy shallow vegetation and would be subject to increased predation as water levels drop below the shallow aquatic macrophyte zone.

Quantity and Quality of Aquatic Food Base.—Aquatic plants that support bacteria, zooplankton, benthic invertebrates, and fish can be affected directly and indirectly by water level fluctuations. Water level changes directly affect phytoplankton (single-celled algae) by physical entrainment and removal in reservoir outflows (Benson and Cowell 1967) and indirectly affect nutrient concentrations, turbidity (which affects light levels), temperature, and grazing pressure (Jones and Bachmann, Prediction..., 1978; Jones and Bachmann, Trophic..., 1978).

Zooplankton—Water level changes rarely directly affect zooplankton. Direct effects are limited to displacement or removal, due to shortened water retention time (Benson and Cowell 1967). As reservoir pool elevation drops 10 feet, water temperatures would increase slightly. The north pool would remain weakly stratified, while the south pool would become slightly more stratified. Water quality conditions in the north pool would not change under any of the drawdown and refill scenarios. The exchange rate would be similar to the present condition. Nutrients and zooplankton would continue to be diverted into Banks Lake from the Columbia River as at the present time. The overall abundance and diversity of zooplankton would not be significantly impacted by the Action Alternative.

Benthic Invertebrates.—Benthic invertebrates are directly affected by changes in water levels: (1) exposure and mortality of species with poor mobility or without resting mechanisms, and (2) entrainment and loss of planktonic stages from reservoirs during periods of rapid discharge (Agass 1960). Indirect effects result from changes in habitat, food resources, or the chemical environment. The most obvious direct effect of water-level changes on benthos is exposure and desiccation after drawdown. Mortality of exposed organisms reduces populations within the fluctuation zone and may partly explain the inverted vertical distributions of benthos observed in fluctuating reservoirs. The abundance of benthos in nonfluctuating reservoirs usually is greater in shallow areas than in deep areas; however, in fluctuating reservoirs, inverted distributions may result from the lack of a littoral community or concentration of mobile species at or just below the drawdown limit (Davis and Hughes 1966; Cowell and Hudson 1967).

Adverse impacts to benthic invertebrates from drawdowns at other reservoirs have been well documented. Limnological studies conducted in Hungry Horse and Libby Reservoirs described seasonal productivity of the food web in relation to drawdown (Independent Scientific Advisory Board 1997). Summer and fall growth periods for mountain whitefish, northern pikeminnow, largescale suckers, longnose suckers, and yellow perch were driven mainly by abundance of zooplankton and benthic midges, although terrestrial insects were also of considerable importance. Availability of these forage sources was found to be influenced by seasonal temperature and drawdowns. Reservoir environments were more productive, and fish grew faster when reservoirs filled early and were not deeply drafted in the summer. August drawdown affects a somewhat different complex of invertebrates, leading to reductions in the food supply for resident fishes at a critical time for growth. Because those invertebrates have a life cycle extending for more than 1 year, their reduction in the fall carries over into the spring, exacerbating the changes brought about by spring drawdown (Independent Scientific Advisory Board 1997). The applicability of these studies to Banks Lake benthic invertebrates is somewhat offset by the scale of the drawdowns. At Banks Lake, the proposed additional drawdown is 5 feet whereas the drawdowns at Hungry Horse and Libby were 30 feet or more.

It is likely that some adverse impacts to benthic invertebrates would occur during the 5-foot August drawdown to elevation 1560 at Banks Lake, resulting from changes in water levels through exposure and mortality of species with poor mobility or without resting mechanisms. Mortality of exposed organisms would reduce populations within the fluctuation zone. Indirect effects result from changes in habitat, food resources, or the chemical environment.

Summary of Impacts.— A summary of impacts to fish and its habitat for spawning and nurseries, juvenile fish predation, and aquatic food base is shown in table 4-4, 4-5, and 4-6.

Table 4-4.—Summary of impacts to quantity and quality of spawning and nursery habitat

Measurement	No Action	Action Alternative
Shallow aquatic macrophytes	Present distribution, abundance, and species composition likely to remain unchanged.	Low impact. Drought -tolerant species including the two dominant species at Banks Lake—reed canarygrass and Baltic rush, as well Nebraska sedge, beaked sedge, hardstem bulrush, common spikerush, common cattail, and narrow-leaved cattail would persist in the littoral zone and continue to be available to spawning adults and rearing larvae. Cattails and reed canarygrass stands may become denser, which may lower suitability for spawning and rearing. Drought-sensitive plant species may be replaced by drought-tolerant species. Substrate in low gradient bays and shorelines would not change due to erosion or sediment deposition.
Shallow, unvegetated flats	Present conditions would remain unchanged. Significant erosion unlikely.	Low impact. Low gradient flats would remain available below water surface elevation 1560 feet in most areas of the lake. Substrate in low gradient flats would not change due to erosion or sediment deposition. Some areas of steep gradients subject to increased erosion.
Boulders, cobble, gravel	Present conditions would remain unchanged.	Low impact. Drawdown may remove some fine sediment, but basic structure would remain unchanged.

Table 4-5.—Summary of impacts —Susceptibility of juvenile fish to predation

Species	No Action	Action Alternative
Channel catfish	No impact. No increase in susceptibility to predation.	No impact. Juveniles rely on shallow water for predator protection, but not on vegetation cover. Shallow water would still be available below 1560 ft in most areas. No increase in susceptibility to predation.
Brown bullhead	No impact. No increase in susceptibility to predation.	No impact. Susceptibility of juveniles to predation unchanged, as they are normally dispersed in deeper water by August.
Yellow bullhead	No impact. No increase in susceptibility to predation.	Adverse impact. Juveniles dependent on aquatic macrophyte cover for predation protection. Would be forced from cover and exposed to predation 23 to 43 days, depending on drawdown scenario.
Largemouth bass	No impact. No change in susceptibility of juveniles to predation.	Adverse impact. Young cruise shoreline as they mature but still require cover of logs, brush, and aquatic macrophytes for predator protection. Would be exposed to increased predation 23 to 43 days. Relatively large size of young (2 to 5 inch) may reduce predation risk somewhat.
Smallmouth bass	No impact. No change in susceptibility of juveniles to predation.	No impact. Susceptibility of juveniles to predation unchanged, as juveniles are dispersed in deeper water by August.
Black crappie	Same as above.	No impact. Susceptibility of juveniles to predation unchanged, as juveniles are dispersed in deeper water by August.
Bluegill	Same as above.	No impact. This species withstands extreme water level fluctuations well.
Pumpkinseed	Same as above.	Adverse impact. Young rely on dense aquatic macrophytes for predator protection. Preyed on heavily by many species. Juveniles exposed to increased predation risk 23 to 43 days.

Species	No Action	Action Alternative
Walleye	Same as above.	No impact. Susceptibility of juveniles to predation unchanged, as juveniles move toward lake bottom in 10 to30 feet of water by late summer and would be unaffected by drawdown to elevation 1560 feet.
Yellow perch	Same as above.	Adverse impact. Juveniles rely on dense aquatic macrophytes until late fall. Size of young can be as small as 1.8 inch in August. Preyed on heavily by predatory fish. Would be exposed to increased predation 23 to 43 days.
Rainbow trout	No impact. Unable to establish reproducing population.	No impact. Trout stocked at larger sizes would not be susceptible to predation.
Kokanee	No impact. Reservoir population has declined signifi-cantly, due to insufficient zoo-plankton populations.	No impact. No increase in zooplankton production anticipated. Populations would continue to rely on stocking larger individuals.
Lake whitefish	No impact. No change in susceptibility of juveniles to predation over current conditions.	No impact. Susceptibility of juveniles to predation unchanged. Young move into deeper water by early summer.
Mountain whitefish	Same as above.	No impact. Susceptibility of juveniles to predation unchanged as juveniles move offshore in summer.
Longnose sucker	Same as above.	Adverse impact. Young remain in weedy shallows and may be exposed to increased risk of predation 23 to 43 days.
Largescale sucker	Same as above.	Adverse impact. Fry feed in vegetated shallows at night. May be exposed to increased predation 23 to 43 days, depending on drawdown scenario.
Bridgelip sucker	Same as above.	Adverse impact. Young remain in weedy shallows. Exposed to increased risk of predation 23 to 43 days. Young somewhat larger than other suckers in summer (2.5 to 3.1 inch), which may reduce vulnerability to predation somewhat.
Prickly sculpin	Same as above.	Adverse impact. Young rely on shallows with aquatic macrophytes. Exposed to increased risk of predation 23 to 43 days. Young sculpin are quite small (1.4 inch) in summer.
Peamouth chub	Same as above.	No impact. Juveniles move into deeper water in late summer.
Northern pikeminnow	Same as above.	Adverse impact. Young in 3-feet-deep water with vegetation in summer. Exposed to increased risk of predation 23 to 43 days. Young relatively small in summer (1.8 inch) and are vulnerable to predation.
Common carp	Same as above.	No impact. Juveniles move to deeper water as they mature.

Table 4-6.—Summary of impacts to the quantity and quality of the aquatic food base

Measurement	No Action	Action Alternative
Zooplankton	No impact. Low reservoir water retention times would continue to limit zooplankton production.	No impact. No substantial changes in water retention times. No change in zooplankton production.
Benthic invertebrates	No impact. Relatively minor water level changes would allow the continued production of benthic invertebrates.	Moderate impact. Ten foot August drawdown would reduce production of benthic invertebrates in exposed areas, but remaining shallow habitat still productive.

Fish Nets at Dry Falls Dam.—Impacts to the fish nets would be the same as for the No Action Alternative. Maintenance and cleaning using the wash barge would be possible because access to the water would be developed under recreation mitigation activities.

Wildlife

To determine how the proposed August drawdown affects wildlife, the distribution, abundance, and species composition of littoral zone wildlife species were analyzed. Analysis centers principally on the impacts of drawdowns on two habitats: aquatic macrophytes in shallow bays and protected shorelines, and the thin strip of riparian vegetation.

No Action Alternative

The present distribution, abundance, and species composition of wildlife present in the littoral zone of Banks Lake is likely to remain unchanged from existing conditions.

Action Alternative

Raptors.—Most of the nesting substrate for raptors is along the adjacent cliffs, although some raptors may nest on mature cottonwoods and Russian olives along the shoreline. Raptors also use the mature trees as perch sites. It is unlikely that mature trees would be adversely affected either by increased erosion or by changes in groundwater during drawdowns.

Neotropical Migrant Songbirds.— Species such as red-winged blackbirds, yellow-headed blackbirds, and marsh wrens that nest in cattails would be unaffected by the Action Alternative, because aquatic macrophytes would remain largely intact. Other species that nest in riparian vegetation (such as willows, Russian olive, and cottonwoods) would not be affected, because little change, if any, would occur to mature trees. Over the long term, the seedlings of some willow species, as well as cottonwood, may be adversely impacted by extended drawdown periods. This may ultimately affect recruitment of the population of these plant species, which, in turn, may affect nesting substrate for some species of warblers, grosbeaks, and vireos. Those species nesting in the uplands around Banks Lake would not be affected.

Waterfowl.—Water levels would remain stable during the waterfowl nesting and brood rearing season. Adequate aquatic macrophytes should remain available for cover and nesting. Drawdowns, however, do have an adverse impact on benthic invertebrates, which form a major source of food for newly hatched young. Grimas (1964) found that reservoir fluctuations as little as 33 feet can destroy littoral benthos, while 20-foot fluctuations can reduce densities up to 50 percent (Grimas 1962). The ability of benthic invertebrates to recolonize areas after drawdown may be insufficient to provide adequate food during this critical period. Offsetting this situation, however, is the potential for vegetation to establish in the variable (drawdown) zone during the last part of the growing season following the 10-foot drawdown. When reflooded in the fall, these plants provide excellent food for waterfowl, as well as fish.

Colonial Nesting Birds.—Under the Action Alternative, water levels would begin to decline after most chicks have been fledged. No land bridges that could provide access to nesting colonies by mammalian predators would be created.

Mammals.—The structure of aquatic macrophytes stands and riparian habitat would remain fundamentally unchanged. It is unlikely that mammals using either of these habitats would be adversely affected by the Action Alternative. However, highly aquatic species, such as the muskrat, may temporarily lose the cover of aquatic macrophytes during the drawdown period and may be at increased risk of predation. There should be no impact to muskrat or beaver dens that occur along the banks of the lake.

Amphibians and Reptiles.—The most notable impact of drawdowns to amphibians occurs when water levels are lowered in winter. The subsequent freezing of sediments can kill frogs, turtles, and invertebrates that overwinter in the drawdown area. However, all Action Alternative scenarios call for refill by September 22. Thus, winter mortality should not be a factor. Several amphibian species that potentially could inhabit Banks Lake use shoreline and upland habitats such as rotten logs, rocks, and low plant growth in the riparian area. Impacts are unlikely to occur to adults; however, the young of some species, such as salamanders, may be affected if they are unable to metamorphose to adults before the August drawdown begins. Highly aquatic species that rely on thick aquatic macrophytes, such as bullfrogs, would not be affected, because drawdowns are likely to cause common cattails to increase slightly. Habitat for reptiles is predominantly in the adjacent uplands, as well as in the riparian vegetation. These habitats would not be affected by the Action Alternative.

The Action Alternative would not adversely impact the distribution, abundance, and species composition of wildlife in the study area.

Summary of Impacts.—A summary of impacts to wildlife is shown in table 4-7.

Table 4-7.—Summary of impacts to wildlife

Measurement Distribution, abundance, and species composition of littoral zone wildlife	**No Action**	**Action Alternative**
Raptors	No impact. Present distribution, abundance, and species composition likely to continue unchanged.	Low impact. No adverse impacts to mature perch trees, but seedlings may be affected, reducing the availability of perch trees in the future. Russian olive would likely continue to spread, providing perching and nesting substrate. Distance to water from perch trees for species foraging on fish or waterfowl would be increased during drawdown, resulting in some adverse impact. Overall abundance of fish and waterfowl as food base would likely remain similar.
Neotropical migrant songbirds	No impact. Present distribution, abundance, and species diversity likely to continue unchanged. Populations would continue to be adversely impacted by external mortality factors, such as winter habitat losses, migration mortalities, etc.	Low impact. Drought -tolerant aquatic macrophytes would continue to provide cover and food. Riparian vegetation would continue to persist.
Waterfowl	No impact. Present distribution, abundance, and species likely to continue unchanged. Populations would be influenced by breeding habitat conditions in northern ranges.	Low impact. Water levels would remain stable during nesting and brood rearing. Drought-tolerant aquatic macrophytes would continue to provide cover and food.
Colonial nesting birds	No impact. Present distribution, abundance, and species composition likely to continue unchanged.	Low impact. Aquatic macrophytes would remain widespread, though some species changes may occur as drought-intolerant species drop out. Water levels drop after chicks fledge. No increased of predation would occur.
Mammals	No impact. Same as above.	Low impact. Habitat values remain largely unchanged; however, muskrats may be exposed to increased risk of predation.
Amphibians and reptiles	No impact. Same as above.	Low impact. Reservoir refilled before winter frost could kill any amphibians in mud substrate. Aquatic macrophyte stands remain largely intact. Reptile habitat unaffected.

Threatened, Endangered, and Special Status Species

The analysis of impacts to threatened, endangered, and special status species centers on potential impacts to the habitat required for each species, as well as potential changes in the availability of prey for species, such as the bald eagle.

No Action Alternative

Threatened, endangered, and special status species at Banks Lake would likely continue unchanged into the foreseeable future or may improve somewhat. Protective measures discussed in the Resource Management Plan for Banks Lake would likely improve overall habitat quality by instituting protective measures.

Action Alternative

The Banks Lake drawdown would augment flows in August, when flow objectives at McNary Dam are 200,000 cubic feet per second (cfs). This flow objective is intended to primarily benefit Snake River fall chinook salmon. The Snake River fall chinook juvenile migration tends to peak in mid-July, with numbers tapering off into mid-August. Nearly half of the Snake River fall chinook can be transported from the Snake River collector dams and may not benefit from flow augmentation through the McNary to Bonneville reach of the Columbia River (Connor et al, 1998; Connor et al. 2000; Conner et al. 2002; Connor et al. 2003a; Connor et al. 2003b). However, even barged fish are likely to benefit from flow augmentation from Bonneville Dam to ocean entry. A detailed analysis of impacts of flow augmentation is contained in the Biological Opinion (NMFS 2000). This document is incorporated in this EIS by reference.

The following analysis of impacts to federally listed threatened and endangered species present, or potentially present, at Banks Lake is included in the EIS as part of Reclamation's Biological Assessment, required under section 7(a)(2) of ESA.

Snake River Fall Chinook

This species migrates through the lower Snake and Columbia Rivers. Additional flows may potentially benefit this species. A detailed analysis of the benefits of flow augmentation is contained in the Biological Opinion (NMFS 2001) and is included in this document by reference.

Pygmy Rabbit

The Action Alternative would not affect the adjacent sagebrush-steppe community at Banks Lake either directly or indirectly and, therefore, would not affect the pygmy rabbit.

Bald Eagle

Bald eagles could be potentially impacted by changes in reservoir fish abundance and availability in shallow areas, abundance of waterfowl, and availability of suitable perch trees along the riparian zone. Overall abundance of fish may be adversely impacted as juveniles of nearly half of the species present would be forced out of the protective cover of aquatic macrophytes and subjected to increased predation during the August drawdown. However, these adverse impacts are moderated by the fact that exposure to predation occurs during a relatively short timeframe—23 to 43 days—and the fact that aquatic macrophytes would remain throughout the shallow littoral zone habitats, providing spawning substrate and cover for rearing juvenile fish. Water levels during critical spawning and rearing periods would not be altered from the current condition. Some decrease in benthic invertebrates and algae, as a result of drawdown, would reduce available food and slightly affect fish productivity. Overall zooplankton productivity is not anticipated to change.

Late summer drawdowns may encourage the growth of plants in the drawdown zone. The late summer drawdown, followed by rising water levels in the fall, is the basic technique used by reservoir managers to provide food for migrating waterfowl. It is possible that waterfowl numbers could increase during fall and winter as a result of August drawdowns. However, the supply of fish and waterfowl is not limiting to bald eagles currently present at Banks Lake. The slight increase in waterfowl availability is unlikely to benefit or adversely affect eagles.

Mature cottonwoods and willows are unlikely to be reduced or eliminated as a result of the Action Alternative, nor is the risk of erosion expected to increase. Therefore, mature perch trees used by eagles would be unaffected in the short term. However, over the long-term, if seedling survival is compromised during August drawdowns, the availability of perch trees may be reduced. This situation may be offset somewhat by Russian olive, an exotic species that is rapidly colonizing the shoreline of Banks Lake. As this is a drought-tolerant species, it is likely to continue to thrive and may provide suitable perches.

The increased distance between the water level and shoreline perch trees during the August drawdown may affect but not likely to adversely affect bald eagles. Eagles may be forced to abandon frequently used perch trees in favor of cliffs. Cliffs and other rocky outcrops, while used for perches by foraging eagles, are not preferred perch sites.

Ute Ladies'-Tresses

The Service (2002) indicates that the most suitable habitat present in the Banks Lake area exists at Bebe Springs and along two intermittent streams on the northwest side of Banks Lake. It is unlikely that these potentially suitable habitat areas would be affected by the Action Alternative.

Western Sage Grouse

Sagebrush-steppe communities needed by sage grouse exist above the influence of the littoral zone at Banks Lake and would not be affected by the Action Alternative.

Washington Ground Squirrel

Sagebrush-grassland habitat suitable for the Washington ground squirrel exists outside the influence of Banks Lake water levels. Additionally, it is unlikely that significant indirect impacts would occur to such factors as predator densities.

Species of Concern

Fringed Myotis.—Benthic invertebrates (mayflies, caddisflies, stoneflies, etc.) would be somewhat impacted by August drawdowns, resulting in some decreases of adult aquatic insects potentially available for bats. However, the overall structure and function of the aquatic macrophytes would remain intact, as would riparian vegetation species and the adjacent upland species. Insects that utilize these plants would remain unaffected and would be available for foraging bats. Roosting habitats would not be affected by the 10-foot drawdown.

Long-Eared Myotis.—Same as for fringed myotis.

Pale Townsend's Big-Eared Bat.—Because this species tends to forage more in uplands than over water or riparian areas, it is unlikely to be affected by the proposed drawdown.

Small-Footed Myotis.—This bat forages around cliffs, rock outcrops, and dry canyons and is unlikely to be affected by the proposed 10-foot drawdown.

Yuma Myotis.—The roost located near Northrup Creek would not be affected, nor would any human or resource management activities be altered as a result of the proposed 10-foot drawdown. Benthic invertebrates may be slightly reduced as a result of the August drawdown, but it should not adversely affect overall foraging for the Yuma myotis.

Black Tern.—The black tern may potentially exist in the marsh areas of Banks Lake during spring or fall migration. However, the proposed drawdown would not occur until August, and would be refilled by September 10. Overall productivity of the marshes in the littoral zone of Banks Lake would not be significantly reduced by the proposed drawdown and, thus, would not adversely affect the black tern.

Columbia Sharp-Tailed Grouse.—The proposed August drawdown would not adversely impact the shrub-steppe, grassland, or riparian habitats at Banks Lake and, thus, would have no effect on the Columbia sharp-tailed grouse.

Loggerhead Shrike.—The shrub-steppe habitats would not be affected by the proposed drawdown, nor would potential perch trees required by this species. There would be no effect to the loggerhead shrike.

Olive-Sided Flycatcher.—The coniferous trees in Northrup Canyon potentially used by this flycatcher would not be affected by the August drawdown.

Western Burrowing Owl.—The proposed drawdown would not affect any habitats utilized by this owl, as they are outside the Banks Lake littoral zone.

Northern Sagebrush Lizard.—The proposed drawdown would not affect any habitats utilized by this lizard.

Columbia Spotted Frog.—The Columbia spotted frog has been documented in the Banks Lake area (Service 2002), as well as scattered across much of eastern Washington. It prefers warm water marshes, wetlands, and bogs with nonwoody wetland vegetation. Given the abundant population of predatory fish in Banks Lake, it is unlikely that this species would be found in Banks Lake itself. However, there are several marshes on the east side of Highway 2, adjacent to Banks Lake that may provide suitable habitat. Declines in groundwater levels associated with the August drawdown may lower the water in these marshes. Larvae should have metamorphosed by late August and would not be adversely impacted by temporary declines in water level.

California Floater.—Overall, fish populations would not be significantly affected by a 10-foot August drawdown. While this species has not been documented at Banks Lake, the suitability for this snail species would continue to be adequate.

Chelan Rockmat.—Potential habitat along the basalt cliffs would be unaffected by an August drawdown.

Sticky Phacelia.—Potential habitat along the basalt cliffs would be unaffected by an August drawdown.

Table 4-8 presents a summary of impacts to species of concern.

Table 4-8.—Summary of impacts to species of concern

Species	No Action	Action Alternative
Snake River fall chinook salmon	No impact.	Potential beneficial impact. Contributes to flow augmentation for juvenile migration.
Pygmy rabbit	No impact.	No impact. Sagebrush-steppe habitat would not be affected by proposed drawdown.
Bald eagle	No impact to breeding or winter habitat.	No impact to food and perch availability. Potential impact during drawdown, as distance from perches to lake level for foraging increase.
Ute ladies'-tresses	No impact.	No impact to potential suitable habitat at Bebe Springs and two intermittent streams.
Western sage grouse	No impact.	No impact to sagebrush-steppe habitat.
Washington ground squirrel	No impact.	No impact. Sagebrush-steppe habitat not affected by drawdown.
Fringed myotis	No impact.	No impact. Some benthic invertebrates would be adversely affected, but overall insect abundance would remain unaffected.
Pale Townsend's big-eared bat	No impact.	No impact to roosting or foraging habitats.
Small-footed myotis	No impact.	No impact to roosting or foraging habitats.
Yuma myotis	No impact.	No impact to Northrup Canyon roost site. Overall insect abundance unaffected.
Black tern	No impact.	No impact to fall and spring habitat areas in aquatic macrophytes.
Columbia sharp-tailed grouse	No impact.	No impact to habitat areas in Barker Canyon or Northrup Canyon.
Loggerhead shrike	No impact.	No impact to shrub-steppe, pine-oak, and pinon juniper woodlands.
Olive-sided flycatcher	No impact.	No impact to conifer trees in Banks Lake area.
Western burrowing owl	No impact.	No impact to shrub-steppe habitat.
Northern sagebrush lizard	No impact.	No impact to sagebrush-steppe habitat.
Columbia spotted frog	No impact. Unlikely to be present in Banks Lake, due to presence of abundant predatory fish. May be in adjacent wetlands.	No impact. Water level in adjacent wetlands may decline after young have metamorphosed to adult stage.
California floater	No impact.	No impact.
Chelan rockmat	No impact.	No impact to potential habitat along basalt cliffs. Outside littoral zone and influence of August drawdown.
Sticky phacelia	No impact.	No impact to potential habitat along basalt cliffs. Outside littoral zone and influence of August drawdown.

Recreation

No Action Alternative

Historically, elevation changes to Banks Lake have an effect on the availability of recreational resources surrounding the lake. Under the No Action Alternative, there are no additional effects on the current recreational opportunities at Banks Lake. Banks Lake is recognized locally and regionally for its diverse and outstanding recreational opportunities. These opportunities exist throughout the area for camping, swimming, boating, picnicking, and other recreational pursuits under the No Action Alternative.

Public use varies seasonally, with peak activity and visitation occurring from mid-May through September. Both local residents and people who generally travel 100 to 200 miles use the area. Most out-of-area users are from the Puget Sound (Seattle/Tacoma) area, and are looking for uncrowded recreational opportunities, sunny days, and warm water. Over the Labor Day weekend, most camping and recreational facilities are at full capacity.

Action Alternative

The Action Alternative may have various impacts to the recreational opportunities at Banks Lake. Of the 19 developed recreational areas, 12 maintain usable boat launches. Anecdotal evidence, developed during the project's scoping process, suggests that drawing the lake down lower than elevation 1565 feet would negatively affect some recreational facilities and operations on the lake. For example, the following boat launches are left out of the water and thus rendered unusable at elevations lower than 1565: Steamboat Rock State Park, Sunbanks Resort, and Coulee City Community Park (see figures 3-2 and 3-3). Coulee City Community Park has the only accessible boat launch for the southern half of the lake at elevation 1565 feet. A 10-foot drawdown to elevation 1560 feet would leave only two boat launches for use: Steamboat Rock Rest Area and Coulee Playland. These two boat launches are located on the northern portion of the Lake. No boat launch would remain for the southern half of the lake.

Reclamation does not directly manage any of the recreational sites at Banks Lake. The WDFW is currently responsible for the operation and maintenance of six boat launch sites, and the SPRC is responsible for three boat launch sites at Banks Lake. Operation and maintenance responsibilities for the other boat launches located on the lake (Coulee Playland, and Coulee City Community Park) are the responsibility of the respective lessee or concessionaire. Sun Banks Resort is located on non-Federal land and is administered by the WDNR.

At lower lake levels, sandy beach areas may be far from the water's edge with unattractive and unappealing mud flats being exposed. This would discourage swimming and other beach activities. These changes to the recreational opportunities may have adverse effects and lead to decreased visitor use at the recreation areas on the lake.

The Washington State Department of Transportation is concerned that lower water levels may affect the stability of the road bed where State Highway 155 directly abuts the lake. Wave action on the lower portion of the subgrade may erode the roadway foundation. In addition, the underground/underwater power line that serves the recreation area at Steamboat Rock State Park would be exposed near the Steamboat Rest Area and Boat Launch.

As previously stated, the primary facilities that could be affected by lowering the lake would be boat launches, mooring docks, and swimming beaches at the various water access sites. In addition, the channels used to proceed from the boat launching areas (i.e., at Coulee City Community Park, Steamboat Rock State Park, and Sun Banks Resort) to the main body of the lake may become too low to allow the passage of watercraft. During drawdowns, rocks and sandbars are sometimes exposed or lie just below the surface. Launching is reported to increase at the Steamboat Rock Rest Area and Boat Launch during low water surface elevation periods (Steinmetz 1998).

Recreation Visits.—The recreational opportunities that are available at Banks Lake can be reduced because of several factors. A degree of difficulty regarding watercraft access may be present at water elevations below 1565 feet. A minimum water elevation of 3 feet above that toe of a boat ramp is usually necessary for launching a medium sized boat. Only two boat launches would be available at elevation 1560 feet, Coulee Playland and the Steamboat Rock Rest Area and Boat Launch. Watercraft could access the lake; however, it would be limited, and usage would increase at those sites.

Dock and mooring areas may also be rendered unusable by lower water levels. Most docks on the lake are floatable to accommodate some variation in lake levels and still be usable. However, because the lake elevation rarely has gone lower than elevation 1565 feet, docks and mooring areas may be unusable at this level without additional modifications. Accessibility requirements would also have to be addressed.

Coulee City Community Park, the channel between Devil's Punch Bowl and the main body of the lake, and Sun Banks Resort have been identified as places where water levels below elevation 1565 feet impede watercraft access to the main body of the reservoir.

Swimming is a popular activity at Banks Lake. Low water levels may negatively affect the four developed swimming areas on the reservoir. Beach areas may be left high and dry at water levels below 1565 feet.

Mitigation

Extending boat launches, modifying mooring docks, and dredging deeper channels would improve watercraft access at lower water levels. Funds would be provided to ensure that usable boat ramps, courtesy docks, and swimming areas still exist on both the north and south ends of Banks Lake so that public access would be maintained to the lake for recreational purposes.

Economics

Hydropower Resources

The Bonneville Power Administration has developed a Federal Columbia River Basin Power System model that they use to determine power impacts to the integrated FCRPS system resulting from changes in facility operations at the different participating projects. The changes in operation of Banks Lake and Grand Coulee Dam and the resulting impact to FCRPS hydropower generation under the Action Alternative were evaluated by BPA. Reclamation estimated impacts to the three PUDs. GCPHA provided estimates of changes in power generation at the Main Canal Powerplant as a result of changes in head due to Banks Lake level fluctuations.

Power impacts are composed of two measures—the first being capacity values, the second being energy values. Capacity values are derived from the fixed costs of the hydropowerplants and include the fixed costs of the plant, fixed fuel inventory cost, fixed operation and maintenance (O&M) costs, administrative and general expenses, and transmission costs and losses to load center. Energy values are composed of the variable costs of the hydropowerplant and are made up of two components, variable O&M cost and variable fuel costs.

Hydropower Generation Impacts

Changes in power generation for all Grand Coulee powerplants and the resulting impacts to the FCRPS would occur mainly in the month of August, when Banks Lake would be drawn down to its lowest levels under the Action Alternative. These changes in hydropower generation at Grand Coulee and the five PUD hydro-powerplants result from changes in the timing and duration of releases from Grand Coulee Dam to meet endangered fish flow targets in the Columbia River at McNary Dam. Water that would have been pumped from FDR Lake up into Banks Lake during the month of August would be released through Grand Coulee Dam. Banks Lake would be drafted by irrigation demands and then refilled in September to elevation 1570 feet. The August release from FDR Lake and September refill of Banks Lake results in changes in power revenues due to lower power rates in August (when additional power is generated from increased releases from Grand Coulee Dam) and higher rates in September (when power generation is reduced due to flows being diverted to Banks Lake instead of the Columbia River). Additional revenue impacts to the FCRPS and the PUD hydropowerplants would also be experienced as a result of spill requirements. During August, some projects are required to spill a percent of their flow for fish passage, thus they are not able to run all of the flows through their generators to produce power. This results in a reduced amount of water to generate with as well as reduced revenues from selling power at lower August power rates. There are no spill requirements in September.

Less energy would be generated at the GCPHA Main Canal powerplant because of the head loss accompanying reduced lake elevations. This would also continue until Banks Lake refilled.

FCRPS Impacts

Preliminary impacts to the FCRPS were provided by BPA and were discussed by level of drawdown for each alternative for comparison. Impacts were measured as a result of Banks Lake drawdown from water surface elevation 1570 feet to 1565 feet and elevation 1565 feet to 1560 feet during the month of August and reported in megawatt-hours (MWh). MWh impacts were then converted to real dollar values, using replacement cost values representing the next 3 years rates for the mean Light Load Hour (LLH) and Heavy Load Hour (HLH) rates estimated by BPA. The net energy[1] impact resulting from refill of Banks Lake to elevation 1570 feet by September 23 was also estimated, as well as an estimate of the net annual revenue impact from a comparison of the No Action and Action Alternatives. BPA anticipates that there would be no change in total FCRPS capacity[2] as a result of the Action Alternative flow changes and timing of releases from Grand Coulee Dam through Bonneville Dam. Additionally, because the net energy loss over the August-through-September period is small, there is no significant effect on the FCRPS ability to meet future loads. Tables 4-9 and 4-10 display the FCRPS energy generation for each alternative.

---

[1]Energy is the electric power provided by generators and measured in kilowatts over a period of time, usually hours, to yield kilowatt-hours (kWh).

[2]Capacity is the maximum load or demand that a generator or system can carry under existing service conditions.

Table 4-9.—FCRPS energy generation
No Action Alternative (MWh and $).

No Action Alternative	Low water scenario	Early, Uniform, and Late Drafts
Power generated from Grand Coulee to Bonneville	85,000	85,000
Value of energy generated	$2,079,100	$2,587,400
Reduced pump load by not pumping to Banks in August	33,000	33,000
Value of energy generated	$807,180	$1,004,520
Pump load to refill Banks to elevation 1570 feet	(33,000)	(33,000)
Energy replacement cost	($1,180,080)	($1,180,080)
Loss in generation from Coulee to Bonneville due to refill	(93,000)	(93,000)
Energy replacement cost	($3,325,680)	($3,325,680)
Total FCRPS energy impact (MWh)	**(8,000)**	**(8,000)**
Total FCRPS revenue impact	**($1,619,480)**	**($913,840)**

* Banks Lake would begin drafting July 22 from elevation 1570 feet to be at water surface elevation 1565 by August 1. These numbers are compared to no draft at Banks Lake.
Source: BPA, FCRPS model.

Table 4-10.—FCRPS energy generation
Action Alternative (MWh and $).

Action Alternative	Low water scenario	Early, Uniform, and Late Drafts
Power generated from Grand Coulee to Bonneville	166,000	166,000
Value of energy generated	$4,544,740	$5,053,040
Reduced pump load by not pumping to Banks in August	66,000	66,000
Value of energy generated	$1,811,700	$2,009,040
Pump load to refill Banks to elevation 1570 feet	(66,000)	(66,000)
Energy replacement cost	($2,380,000)	($2,380,000)
Loss in generation from Coulee to Bonneville due to refill	(182,000)	(182,000)
Energy replacement cost	($6,562,792)	($6,562,792)
Total FCRPS energy impact (MWh)	**(16,000)**	**(16,000)**
Total FCRPS revenue impact	**($2,586,352)**	**($1,880,712)**

Source: BPA

No Action Alternative—Under this alternative, Banks Lake water surface elevation could draft to elevation 1565 feet prior to August 1 during a low water year or be lowered from1570 to1565 feet in August during normal water years. During a low water year in which Banks Lake remained at water surface elevation 1565 feet for the month of August, drafting Banks Lake from water surface elevation 1570 feet to elevation 1565 feet would occur during the latter part of the month of July and provide 85,000 MWh of energy production. During normal water years, drafting

Banks Lake from elevation 1570 to 1565 feet would likewise result in 85,000 MWh of energy production to the FCRPS for the month of August, due to higher Grand Coulee flows through Bonneville. Not pumping water from FDR Lake into Banks Lake to replace irrigation demands for the month of July and August would reduce the FCRPS load by about 33,000 MWh per 5 feet of draft.

The refill of Banks Lake from water surface elevation 1565 to 1570 feet would require an additional load of 33,000 MWh to run the pumps and would result in a loss of generation of 93,000 MWh of energy, due to the reduction of flows from Grand Coulee Dam through Bonneville Dam. Annual energy impacts to the FCRPS result in a generation loss of 8,000 MWh under all the No Action Scenarios.

Action Alternative.—

Low Water Scenario.—Estimated power generation for the Action Alternative low water scenario which drafts Banks Lake from water surface elevation 1570 feet to1565 feet in the last 10 days of July and then from 1565 to1560 the first 10 days of August and refills to elevation 1570 feet during the first 22 days of September results in net energy loss to the FCRPS of 16,000 MWh.

Early, Uniform, and Late Draft Scenarios.—The early draft scenario starts with Banks Lake at water surface elevation 1570 feet on August 1 and relies on the expected irrigation demands for the month to draft the lake down to water surface elevation 1560 feet. This would take 20 to 31 days, after which pumping would resume to maintain Banks Lake at water surface elevation 1560 feet through the end of the month. The uniform draft scenario assumes that beginning August 1, the Banks Lake pool water surface elevation is 1570 feet and is drafted evenly through August to water surface elevation 1560 feet. The late draft scenario would start drafting Banks Lake from elevation 1570 feet on August 11 reaching the final elevation of 1560 feet on August 31.

These three scenarios would each result in 166,000 MWh of energy production to the FCRPS for the month of August, due to higher flows from Grand Coulee Dam through Bonneville Dam. A reduction in pumping water from FDR Lake into Banks Lake to replace irrigation demands for the month of August would reduce the FCRPS load by about 66,000 MWh.

The refill of Banks Lake due to this Federal action (drafting from elevation 1570 feet to 1560 feet) requires the refill of 10 feet (elevation 1560 to 1570) by September 23. Refilling Banks Lake from water surface elevation 1560 to 1570 feet would require an additional load of 66,000 MWh to run the pumps and result in a loss of generation of 182,000 MWh of energy, due to the reduction of flows from Grand Coulee Dam through Bonneville Dam.

Taking into account both the drawdown and the refilling of Banks Lake under the Action Alternative scenarios of low water, early, uniform, and late draft, annual energy impacts to the FCRPS result in generation losses of 8,000 MWh under the

No Action alternative scenarios and 16,000 MWh for the Action Alternative scenarios during the July, August, and September time period.

Net Energy Impacts to the FCRPS.—Table 4-11 displays the resulting net changes in FCRPS energy production as a result of comparing the No Action Alternative against the Action Alternative for Banks Lake operational changes. Net energy impacts are a loss of 8,000 MWh for all the scenarios of the Action Alternative. The cost of each of these net energy impacts are calculated using the projected mean LLH and HLH energy values for July, August, and September provided by BPA. This loss can be attributed to spill requirements at the lower FCRPS projects during July and August when drafting Banks Lake. There are no spill requirements in the month of September during refill. Because of spill requirements during July and August, all of the additional flows cannot be used to generate power. Likewise, flows normally used in September to generate will be reduced during the refill of Banks Lake.

Table 4-11.—Net FCRPS energy impacts from Banks Lake operational changes (MWh and $).

Alternative and item	Low water scenario	Early, Uniform, and Late Drafts
No Action Alternative		
Net FCRPS generation (MWh)	(8,000)	(8,000)
FCRPS energy replacement cost through refill of Sept 22	($1,619,480)	($913,840)
Action Alternative		
Net FCRPS generation (MWh)	(16,000)	(16,000)
FCRPS energy replacement cost through refill of Sept 22	($2,586,352)	($1,880,712)
Total net FCRPS change through refill of Sept 22 (MWh)	(8,000)	(8,000)
Total net FCRPS energy replacement cost through refill of Sept 22 ($)	($966,872)	($966,872)

Main Canal Low Head Powerplant —GCPHA

No Action Alternative.—Under No Action, Banks Lake levels do not go below water surface elevation 1565 feet, which represents the normal current historic range of lake operations. The GCPHA powerplant would continue to operate as it has historically, as shown in table 4-12.

Table 4-12.—GCPHA power generation—No Action Alternative

	Low water early draft	Early draft	Uniform draft	Late draft
Maximum daily capacity (MW)	20.5	23.1	23.1	23.1
Energy (MWh)	30,667	31,622	32,100	32,522

Source: GCPHA

Action Alternative.—Table 4-13 displays the capacity and energy generation at the GCPHA powerplant.

Table 4-13.—GCPHA power generation—Action Alternative

	Low water early draft	Early draft	Uniform draft	Late draft
Maximum daily capacity (MW)	20.5	23.1	23.1	23.1
Energy (MWh)	28,972	29,930	30,883	31,711

Source: GCPHA

Table 4-14 displays the GCPHA power generation difference between No Action and the Action Alternative. A capacity cost of $3,300 per MW and an energy replacement cost of $30.44 for August and $36.12 for September per MWh were used to arrive at the maximum estimated annual dollar losses for each alternative comparison.

Table 4-14.—GCPHA power generation impacts

	Low water early draft	Early draft	Uniform draft	Late draft
Capacity difference (MW)	0	0	0	0
Capacity loss	0	0	0	0
Energy difference (MWh)	1,695	1,692	1,217	812
Energy replacement cost	$53,600	$53,527	$39,062	$26,715
Total estimated replacement cost (capacity and energy)	$53,600	$53,527	$39,062	$26,715

Costs for kokanee entrainment net inspection and maintenance would be incurred by either alternative at a cost of $8,000 to $10,000 annually.

Public Utility District Hydropowerplants on the Columbia River

Impacts were estimated to the five PUD hydropowerplants downstream of Chief Joseph Dam, between Chief Joseph and McNary Dams on the Columbia River. A comparison between the No Action and Action Alternative scenarios was made to arrive at the net change in energy production resulting from increased Columbia River flows during August and the subsequent reduced flows attributed to the Banks Lake refill period.

Each of the PUDs would need to replace the net energy generation lost as a result of operations under the Action Alternative to continue providing power to their customers. Using the same average energy replacement cost of $30.44 per for August and $36.12 for September per MWh, the maximum estimated annual dollar losses for each alternative scenario comparison were determined. Table 4-15 displays the energy generation and replacement power cost impacts to Wells, Rocky Reach, Rock Island, Wanapum and Priest Rapids hydropower projects.

Table 4-15.—Energy impacts to PUD powerplants on the Columbia River (MWh).

	Low water	Early draft	Uniform draft	Late draft
No Action Alternative—Energy generation				
Wells	(202)	(202)	(98)	0
Rocky Reach	(420)	(420)	(203)	0
Rock Island	(970)	(970)	(469)	0
Wanapum	(2,425)	(2,425)	(2,425)	(2,425)
Priest Rapids	(3,734)	(3,734)	(3,734)	(3,734)
Total energy generation	(7,751)	(7,751)	(6,929)	(6,159)
Action Alternative—Energy generation				
Wells	(394)	(296)	(191)	(79)
Rocky Reach	(820)	(615)	(397)	(164)
Rock Island	(1,420)	(1,065)	(687)	(284)
Wanapum	(4,733)	(4,733)	(4,733)	(4,733)
Priest Rapids	(7,290)	(7,290)	(7,290)	(7,290)
Total energy generation	(14,657)	(13,999)	(13,298)	(12,550)
Total Net energy impact (MWh of replacement power needed)				
Wells	192	94	93	79
Rocky Reach	400	195	194	164
Rock Island	450	95	218	284
Wanapum	2,308	2,308	2,308	2,308
Priest Rapids	3,556	3,556	3,556	3,556
Total replacement power needed	6,906	6,248	6,369	6,391
Total Net Energy Replacement Cost ($)				
Wells (Douglas Co.)	52,013	1,882	1,238	221
Rocky Reach (Chelan Co.)	72,185	5,616	4,276	2,160
Rock Island (Chelan Co.)	42,845	7,387	8,128	7,337
Wanapum (Grant Co.)	125,663	82,159	82,159	82,159
Priest Rapids (Grant Co.)	158,995	128,156	128,156	128,156
Total net energy replacement cost	451,701	225,200	223,957	220,033

Source: Pacific Northwest Region

Wells, Rocky Reach, and Rock Island Dams have spill requirements in July and the first half of August, but none the second half of August or September. Wanapum and Priest Rapids have spill requirements during all of July and August and none in September.

Summary of Resulting Impacts to Power Rates

Although the pump/generators play an important role in load management for the FCRPS, they are a small part of a large system, made up of many facilities whose operations can be adjusted to compensate for this small overall change in a single facility's generation or use. Net revenue losses based on power replacement costs are estimated to be $966,872 for the Low Water, Early, Uniform, and Late Draft scenarios of the Action Alternative. Spreading these costs over the entire BPA rate base could result in insignificant rate changes. This is borne out in the significant changes in operations for the entire Columbia River power system, which were analyzed for the alternatives in the Columbia River System Operation Review Final EIS.

Impacts to GCPHA as a result of decreased generation and increased expenses could range from annual maximums of $36,715 to $63,600, including annual maintenance costs on the kokanee entrainment nets. These revenue losses range from 5 to 8 percent of GCPHA's annual operating revenues and may affect rates to GCPHA customers. Greater impacts would be expected in drought years when market conditions could result in significantly higher replacement power rates.

Columbia River hydropower generation impacts to the three PUDs of Grant, Chelan, and Douglas Counties range from estimated losses of $221 for Douglas County up to a total of $284,658 for Grant County, based on replacement power costs in August and September of $30.44 and $36.12 per MWh. These impacts collectively range from $220,033 to $451,701. However, these impacts should have an insignificant effect on customer power rates when spread over each counties rate base and its contracted customers.

As a result of the impacts, it is not anticipated that there would be significant retail rate changes, either increases or decreases, to FCRPS, GCPHA, or the three counties PUD customers as a result of drawing down Banks Lake during the month of August and its subsequent refill. Operation and maintenance costs to the power users and irrigators are also not anticipated to be affected by the proposed change in Banks Lake operations.

Regional/Local Economy

It follows that a change in operating procedures like those included in the Action Alternative could have a direct effect on some parts of the local and regional economic environment. Economic data, historic visitor use data, and expected future visitor use, were all considered in identifying and discussing expected impacts. A fourth factor, the length of time the reservoir would be at levels below 1565 feet, was also considered. This analysis and a qualitative analysis of the other factors are provided for the comparison of alternatives for decision making purposes.

The context, intensity, and duration of impacts were used to compare the Action Alternative to the No Action Alternative. Context refers to the relative area within which impacts occur; for the most part, impacts from the Action Alternatives would affect a regional area (Grant County) and/or a local area (e.g., a gateway community such as Coulee City).

Impact intensity is the degree to which a topic is positively or negatively affected. For this analysis, impacts on recreation were qualitatively evaluated and described. The following terms were used to describe the level of impact:

- Negligible – the impact is at the lower levels of detection.
- Minor – the impact is slight but detectable.
- Moderate – the impact is readily apparent.
- Major – the impact is severely adverse or exceptionally beneficial.

Impact duration refers to how long an impact would last. For this evaluation of impacts, the following definitions of duration were used:

- Short term – the impact lasts less than 3 years.
- Long term – the impact lasts more than 3 years (and can be considered a permanent change in conditions).

The various permutations of the No Action Alternative never permit the lake level to go below elevation 1565 feet. This alternative represents the normal current range of lake operations—water surface elevation 1570 feet to 1565 feet. Historically, the most likely operating range was between elevation 1569 feet and elevation 1567 feet. Operation within this range has no additional impacts on recreation at Banks Lake. (Infrequent, every 10 to 15 years, maintenance operations on the dam and other Reclamation facilities may require the lake be lowered to elevation 1545 feet. This low level would severely decrease the recreation opportunities available at the lake.)

Recreation Days.—For purposes of this analysis, it is assumed that recreational use of Banks Lake is not affected when the lake level is between elevation 1570 feet and elevation 1565 feet. Recreation opportunities could be negatively affected when the lake level falls below elevation 1565 feet. A first measure of this negative impact is the number of days that the lake is below this threshold during the month of August. Table 4-16 provides details of the impact analysis based upon the lake levels.

In any 1-year, the Action Alternative can follow a variety of scenarios, depending upon the starting lake level and the procedure of the draft; the Low Water (1565 feet) and the Late Draft Scenarios bound the possible range of scenarios. For the purposes of this EIS, four scenarios have been selected for analysis. Each results in a lowering of the reservoir to elevation 1560 feet for some time in August, depending upon the hydrology of that particular year. The refill period (to reach elevation 1570 feet) is the same for all possible action scenarios and is assumed to be 22 days, which represents the worse case situation.

Table 4-16.—Summary of Banks Lake elevation under No Action and Action Alternatives

Altern-ative	Scenario	Elevation	Time period	Results: Number of days at different elevations	Results: Impacts on recreation
No Action	Low water	1565	Aug. 1-31	31 days at < 1570 ft 31 days at 1565 ft Zero days at < 1565 ft	No impact
	Early draft	1570-1565 1565	Aug. 1-10 Aug. 11-31	31 days at < 1570 ft 21 days at 1565 ft Zero days at < 1565 ft	No impact
	Uniform draft	1570-1565	Aug. 1-31	31 days at < 1570 ft 1 day at 1565 ft Zero days at < 1565 ft	No impact
	Late draft	1570-1565 1565	Aug. 1-21 Aug. 22-31	21 days at 1570 ft 10 days at < 1570 ft Zero days at < 1565 ft	No impact
No Action refill of Banks Lake	Refill	1565-1570	Sept. 1-22 The refill time is the same for all scenarios	22 days at < 1570 ft Zero days at <1565 ft	No impact
Action	Low water	1565-1560 1560	Aug. 1-10 Aug. 11-31	31 days at < 1570 ft 31 days at < 1565 ft 21 days at 1560 ft	31 fewer recreation days Fewer recreation visits Lower $ expenditures Indeterminate effect on net benefits
	Early draft	1570-1565 1565-1560 1560	Aug. 1-10 Aug. 11-20 Aug. 20-31	31 days at < 1570 ft 21 days at < 1565 ft 11 days at 1560 ft	21 fewer recreation days Fewer recreation visits Lower $ expenditures Indeterminate effect on net benefits
	Uniform draft	1570-1565 1565-1560	Aug. 1-15 Aug. 16-31	31 days at < 1570 ft 16 days at < 1565 ft 1 day at 1560 ft	16 fewer recreation days Fewer recreation visits Lower $ expenditures Indeterminate effect on net benefits
	Late draft	1570 1570-1565 1565-1560	Aug. 1-11 Aug. 12-21 Aug. 22-31	11 days at 1570 ft 20 days at < 1570 ft 10 days at < 1565 ft 1 day at 1560 ft	10 fewer recreation days Fewer recreation visits Lower $ expenditures Indeterminate effect on net benefits
Action refill of Banks Lake	Refill	1560-1565 1565-1569 1569-1570	Sep. 1-10 Sep. 11-18 Sep. 19-22	18 days at < No Action elevation; 22 days to reach 1570 ft	10 fewer recreation days for all Action Alternative scenarios

- Low Water from 1565 feet: The water level of the reservoir begins to be lowered on August 1. This variation results in the reservoir being below 1565 feet for 41 days – August 1 through September 10. This scenario provides the lower boundary for the Action Alternative.

- Early Draft from 1570 feet: Under this scenario the lake level would not go below 1565 feet until August 11. The reservoir would be below 1565 feet for 31 days – August 11 through September 10.

- Uniform Draft from 1570 feet: This condition results in the reservoir falling below 1565 feet on August 16. The lake level would be below 1565 feet for 26 days – August 16 through September 10.

- Late Draft from 1570 feet: This situation starts the drawdown on August 12. It is not until August 22 that the reservoir level falls below 1565 feet. The lake level would be below 1565 feet for 20 days – August 22 through September 10. This scenario provides the upper boundary for the Action Alternative.

Recreation Visits.—Historically, lower recreational use at Coulee City Community Park, Steamboat Rock State Park, and Sunbanks Resort were recorded when water levels went lower than elevation 1565 feet. This could result in fewer recreation visits occurring on Banks Lake.

Expenditures.—The economic impacts on Grant County and local businesses are of concern to local interests. Specifically, reduced water access could decrease the recreation opportunities at the lake, thereby resulting in fewer visitors to the commercial enterprises. The lost income for some enterprises can negatively affect their financial viability. Representatives of Coulee City Community Park, Steamboat Rock State Park, and Sunbanks Resort have all expressed concern regarding the impact that lower lake levels may have on their businesses.

However, the overall economic impact on the Grant County economy is expected to be negligible. In 1999, Grant County's economy provided over 38,000 jobs and more than $900 million in earnings to workers. Any decline in business for recreation enterprises would have little effect on these elements of the economy. In addition, recreational businesses are highly seasonal in nature. This fact makes individual firms more susceptible to negative shocks during the summer season but also ameliorates the impact such occurrences have on the county's overall economy.

The local economy at the north end of Banks Lake is based as much on the utility sector, including employment at Grand Coulee Dam and Powerplants, as it is on recreation. The utility portion of the economy is strong, would not be affected by drawdown, and is a year round source of economic strength. The impacts on the economy of the North Grant County area are further demonstrated by the fact that Banks Lake related recreation is a seasonal business, with most of its employees being only temporary hires. The loss of these positions would be less disruptive than the loss of year-round jobs.

Net Benefits.—The net benefits (value of consumer surplus) of recreation opportunities at Banks Lake would be expected to decline because of the reduction in visitor use. However, there are many close substitutes for recreation on Banks

Lake. The vast Lake Roosevelt (Coulee Dam National Recreation Area) lies a short distance northeast of Grant County. A number of lakes and reservoirs offering public recreation opportunities similar to those found at Banks Lake are also found in Grant County; Sun Lakes, and Potholes Reservoir to name two with State Parks on their shores. It is expected that some visitors displaced by the lower water levels at Banks Lake would take advantage of recreational opportunities at these other lakes. If so, then some of the net benefits that would disappear at Banks Lake would reappear at these other reservoirs. The degree to which losses at Banks Lake are gains at other lakes is unknown; thus, the Action Alternative would have an indeterminate effect on net benefits for recreation.

Any adverse impacts resulting from the Action Alternative would be focused within Grant County in general and specifically on a few recreational enterprises located on Banks Lake. Because of the size of the Grant County economy, the economic effects would be negligible at the county level. However, some individual enterprises may be negatively affected from a moderate to major degree. The change of water levels on Banks Lake is a long-term change in the operation of the reservoir. Some of the impacts on local business may be either short- or long-term, depending upon the degree to which local enterprises can accommodate and adapt to the August-September changes in water level.

Irrigated Agriculture

No Action Alternative

Reclamation's ability to provide full irrigation operations from Banks Lake would not be affected.

Action Alternative

The Action Alternative would not impact Reclamation's ability to provide Banks Lake irrigation operations in a normal year. However, during a period when mechanical problems preclude refilling of Banks Lake until after October 31, a near maximum draft of the reservoir would occur and in 3 of the last 10 years, under a worst case example, there would not have been sufficient water in Banks Lake to supply irrigators' demands.

Historic Resources

No Action Alternative

Archeological inventories in the normal drawdown zone identified 107 potentially significant historic properties. Eighty-two of these appear to be affected from erosion by current operations. The major impact to these properties are from water fluctuation and wave action.

Secondary impacts to historic resources from visitor use is an on-going concern. These impacts range from the unintentional, such as trampling from foot traffic, or ruts from off-road vehicles, or dragging a boat over an archeological deposit, to outright vandalism and looting of sites for artifacts.

Reclamation is addressing these impacts as part of the land management programs implemented under the Banks Lake Resource Management Plan.

Action Alternative

The archeological survey of the normal 5-foot drawdown identified 66 additional historic properties, which when incorporating properties that were recorded previously lying adjacent to the drawdown zone impacts about 107 potentially significant historic properties. It is, therefore, reasonable to believe there are several dozen historic properties that would be identified in a drawdown zone below water surface elevation 1565 feet.

Like the No Action Alternative, impacts to historic resources from this alternative, if any, are presumed to be linked to water fluctuations, wave action, alternating wetting and drying of the soil, and wind disturbances. During the peak tourist season, heavy visitation along the drawdown zone would likely lead to intentional or innocent collection of artifacts, perhaps even stimulating organized looting of cultural deposits.

Mitigation

Historic resources that are eligible for the National Register must be managed, and they are eligible for the register until they are determined ineligible. Of concern, however, is that none of the identified properties have yet been formally evaluated for the National Register. This, in itself, is a large task, and it is reasonable to assume that a majority of the known historic resources would be determined ineligible. Nevertheless, an unknown number would be eligible, and management treatments for them present yet another large task. Some of these treatments may involve data recovery, some may safely be left alone, and others may require conservation measures to prevent damage from natural forces.

If the Action Alternative is selected, Reclamation will conduct archeological surveys of the lands exposed by the additional 5-foot drawdown and would complete test excavations to determine site eligibility. In consultation with SHPO and the tribes, Reclamation would define treatments to protect or mitigate impacts to the most significant historic properties.

Traditional Cultural Properties

No Action Alterative

Nine traditional cultural properties would be affected by the normal drawdown, from water surface elevation 1570 feet to elevation 1565 feet, and three of these are believed to be potentially eligible to the National Register. These properties present a task for additional field verification and recording under this alternative. Impacts associated with the No Action Alternative are being addressed under the Banks Lake Resource Management Plan.

Action Alternative

The traditional cultural properties identified in the No Action Alternative are involved, and it is probable more TCPs lie in the drawdown zone below elevation 1565 feet.

Mitigation

Management of traditional cultural properties is a relatively new component of historic preservation and few protocols exist to protect them without a Federal action, as well as provide mitigation in the face of an agency action. In a landscape, such as Banks Lake, where the native cultures are strongly associated, non-material values, such as traditional cultural properties, are difficult to quantify and protect. Evaluation of three known TCP sites within the drawdown area elevation of 1570 to 1565 feet will occur.

Reclamation will consult with tribes to further define actions that might reduce or avoid impacts to National Register eligible TCPs. To the extent consistent with agency authority and multiple use project purposes, Reclamation will implement actions to avoid or reduce impacts.

Native American Sacred Sites

A discussion of Native American sacred sites seeks to disclose whether or not access to sites deemed "sacred" in accordance with Executive Order 13007 would be affected by a proposed action. There are two ways to learn if sacred sites are present, either of which can be inconclusive for reasons unique to the Tribe(s) involved: (1) asking the Tribes directly, or (2) from inference based on related resource surveys, such as surveys for historic resources, traditional cultural properties, or other natural resources, such as plants or geological investigations. Both of these methods apply to the current action.

Current knowledge on the locations and kinds of sacred sites in the drawdown zones is incomplete, primarily because tribal cultures have their own reasons for not sharing the information. Probably because Steamboat Rock is such a prominent landscape feature and figures into the mythology of both the Colville and Yakama Tribes, they have been willing to inform the public that Steamboat Rock is important culturally (Carmack 2001; Consortium of Johnson O'Malley Committees of Region IV 1974: 203) and may represent sacred sites, subject to Executive Order 13007.

No Action Alternative

Access to Steamboat Rock would be the same as currently exists; no other adverse impacts are expected under this alternative.

Action Alternative

Access to Steamboat Rock would not be affected; no other adverse impacts are expected under this alternative.

Indian Trust Assets

No Action Alternative

Much of Banks Lake area retains resources that support hunting, fishing, and gathering activities. Some areas, however, have been disturbed to the extent that they no longer can support such traditional uses. No additional impacts would occur for Indian trust assets under the No Action Alternative.

Action Alternative

There would be no impacts to ITAs in the drawdown zone between water surface elevations 1565 feet and 1560 feet.

Environmental Justice

The Council on Environmental Quality's Environmental Justice Guidance under the National Environmental Policy Act (1997) states race, ethnicity, and income should be examined. Data from the U.S. Census Bureau (1990 and 2000) were used to determine the minority population in the Banks Lake area. As income data from Census 2000 were not available, U.S. Census Bureau County Estimates for People of All Ages in Poverty for Washington: 1998 were used as a proxy for low-income.

Council on Environmental Quality (CEQ) guidance states minority population should be identified where either the minority population of the affected area exceeds 50 percent or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population.

Professional expertise and judgment were used to review impacts of implementing the Action Alternative to determine whether minority or low-income populations would be disproportionately adversely affected.

Although the minority population of Grant County is less than 50 percent of the total population, as discussed in the Economics section, the loss of income for some businesses dependent on recreation at Banks Lake can negatively affect their financial viability. However, racial and ethnic employment data are not available for individual businesses, thus disproportionately adverse impacts cannot be determined for them. Minority agricultural workers would not be affected as no impacts to agriculture were identified. Power rates are not anticipated to change as a result of this action, thus minority and low-income populations would not be disproportionately adversely affected.

No Action Alternative

No adverse impacts would occur under this alternative.

Action Alternative

No adverse environmental justice impacts were identified.

Surface Water Quality

The following indicators have been used for the water quality evaluation:

- Lake changes in temperature profiles, stratification, and other water quality parameters.

- Groundwater changes in concentration and water levels.

No Action Alternative

Four different drawdown scenarios have been developed to show the range of conditions that may occur as the Lake is operated from water surface elevation 1570 feet to elevation 1565 feet, depending upon hydrologic differences. These scenarios would have small differences of water quality between them; timing of the events from each of the scenarios would cause minor differences between them also. Although lowering of the surface elevations may result in slumping, the scenarios that stay at one elevation would have more shoreline erosion than if the erosive processes occur over a range of elevations.

Shoreline erosion would be the greatest for the Low Water Scenario when the lake elevation would be at elevation 1565 feet during most of the month. Surface runoff would wash sediment exposed above elevation 1565 feet into the water. This process would increase the turbidity along the shore of the lake and over time would create an armored section of coarse pebbles or rock in some areas.

The Early Draft Scenario would tend to wash sediment down to elevation 1565 and would erode the sediment at elevation 1565. This would create turbidity along the shoreline where fine sediments exist. The water temperature in these areas would increase temporarily in the shallow waters but would return to normal conditions as the water turbidity reduced.

The Uniform Draft Scenario would distribute the erosive action from elevation 1570 feet to 1565 feet. This may move the sediment into the reservoir quickly as the soils would be wetted and subject to erosion as the water receded between these elevations. However, the erosion would be much the same as with current operations. Changing one month's operation would not change the water quality in any significant way for the year's operation. Sediment would be redeposited to lower elevations as the reservoir was operated at a higher elevation later in the year.

The Late Draft Scenario would be at full elevation during the first 20 days of August and would have little change because the erosion at full pool has already stabilized. Some additional erosion would occur during the beginning of September where fine sediment has been deposited.

Thermal changes occur in the lake as the lake surface is lowered. As the water elevation is decreased, the temperature profile remains constant from the surface to the bottom as water is taken from the bottom for irrigation. The temperature profile of the reservoir would appear much as if the lower 5 feet of the profile was cut off the bottom of the reservoir when the reservoir surface is lowered 5 feet. There would be little change in the water released because of the nearly constant temperature in the bottom of the reservoir. Because the profile does not change the physical and biological processes would not change in the reservoir. Both the No Action and Action Alternatives would change as described above.

Anecdotal reports from fishermen indicate warmer temperature profiles have been observed at lower reservoir elevations. This may be the result of having large areas with shallow water accumulating more heat than at higher elevations plus the volume of water is slightly smaller at a lower elevation. Both factors would increase the water temperature slightly as the shallow warmer water is mixed in the lake. Consequently, the Low Water Scenario, maintained at elevation 1565 feet, would result in the greatest increase in lake temperature. The Early Draft scenario would have the next greatest temperature increase, followed by the Late Draft scenario and then by the Uniform Draft Scenario, which would have the smallest lake temperature increase. The amount of temperature increase would probably be small and would likely be within the range of temperature variations experienced in the past from year-to-year variability of meteorological conditions.

There are elevated levels of total dissolved gas in FDR Lake and the mainstem Columbia River downstream which have been attributed primarily to spills at hydroelectric facilities on the Columbia, Pend Oreille, and Spokane Rivers upstream in the United States and Canada, and from involuntary spills at Grand Coulee. High gas levels occur primarily during the spring and early summer when flood flows in excess of powerplant capacity are spilled. Dissolved gas problems also occur at downstream facilities as a result of both system-wide flood control releases and flow augmentation to support salmon migration. Mainstem total dissolved gas levels are managed to enhance fish passage and to comply with Washington State water quality standards, which have been modified to accommodate salmon recovery efforts. Exceedences of total dissolved gas standards associated with operational spills at Grand Coulee would be virtually eliminated with completion of proposed spill deflectors at Chief Joseph Dam and implementation of joint operation of Grand Coulee and Chief Joseph Dams to facilitate gas abatement. The fate of dissolved gas in Banks Lake has not been studied, and is largely unknown. However, fishery problems associated with gas bubble disease have not been reported in Banks Lake.

Action Alternative

The Action Alternative scenarios consider that the lake level would be dropped to elevation 1560 feet in August. Small changes in temperature profiles and stratification may occur as a result of no pumping from FDR Lake into Banks Lake. Also, the processes that increase the warming would increase as the lake is drawn to a lower elevation. As indicated in the No Action Alternative, nearly the same amount of heat would be entering the surface of the lake and the volume of water may be less at lower elevations and the surface layers of the lake would become warmer as a result. The stratification would become more defined and the surface to bottom temperature difference would increase slightly. The scenarios within the Action Alternative would be discussed in order of least change to greatest change from No Action.

The Low Water Scenario starts at elevation 1565 feet and drops linearly with time to elevation 1560 feet at the middle of the month and stays at the lower elevation longer increasing lake temperatures. The lake would be warmer at the lower elevation of 1565 feet as has been observed historically. The volume from drawdown would be about the same as irrigation needs from August 1 until the middle of the month. Mixing would result in less storing of solar energy in the top layers of the reservoir. After the middle of the month pumping would be needed to maintain elevation 1560 feet. Increased mixing would occur at the first of September and the stored solar energy, in the form of higher temperatures in the upper layer would combine with a constant solar heat input to a lower reservoir volume to heat the lake more than any of the scenarios.

For the Early Draft, the water surface would change from elevation 1570 feet to elevation1560 feet from August 1 to August 21, remain at 1560 until the end of August, then pumping would occur until elevation 1570 was reached. Temperature profiles would be very similar to the No Action early drawdown. With this scenario, the irrigation demand would be supplied by drawdown until August 21, then pumping would be needed to meet irrigation demand until the end of the month. Then increased pumping would fill the Lake to elevation 1570 feet. More pumping than for the Late or Uniform Drafts would occur. Mixing the stored solar energy in the lake and increasing the temperature while the lake was at elevation 1560 feet. Nearly constant solar heating of a smaller reservoir volume would further increase water temperatures.

The Uniform Draft Scenario starts at elevation 1570 feet and decreases linearly to elevation 1560 feet by the end of the month, then pumping starts to reach elevation 1570 feet by September 22. The rate of drawdown is very close to the irrigation demand during August, so no additional pumping would be required from FDR Lake. The pumping would tend to cause more mixing in September and would tend to warm the reservoir to a greater depth than for the Late Draft Scenario. A greater amount of heat would be gained than for the Late Draft Scenario, because nearly the same amount of heat as at full pool would be mixed in a smaller volume of the reservoir over the month of August. As a result Banks Lake would increase in temperature more than it would for the Late Draft Scenario.

The Late Draft Scenario would draw Banks Lake down linearly, beginning August 10 and continuing to the end of the month. Pumping would be needed during the month to meet the irrigation needs and the pumped cooler water from FDR Lake would be most similar to the No Action Alternative conditions. Pumping would start in September and would cool Bank's Lake temperatures. Also heating of the lake would be less than any of the action scenarios because a nearly constant heat transfer into a larger volume of water would minimize the temperature change from No Action. However, the Action Alternative may increase mixing more as the reservoir is refilled and this may cause the nearly uniform temperature to occur earlier in the year. This shift would likely be from 1 to 2 weeks at most. Growth of zooplankton and other biological activities may be decreased compared to the No Action Alternative.

As under the No Action Alternative, total dissolved gas levels in the mainstem Columbia River would continue to be managed to support salmon recovery and provide for compliance with Washington's total dissolved gas standard under all action alternatives. Although the fate of total dissolved gas in Banks Lake has not been studied, and is largely unknown, no dissolved gas would be generated as a result of the proposed increased drawdown of Banks Lake. Further, the proposed September refill period for Banks Lake occurs when total dissolved gas levels in the Grand Coulee forebay are generally in compliance with State and tribal water quality standards.

Groundwater Quality

No Action Alternative

No change to existing groundwater conditions would occur under the No Action Alternative.

Action Alternative

Effects on groundwater quality would be small, if any, due to the short period of time that the water level of Banks Lake is drawn down and the change of water surface is only 0 to 5 feet. Some local fissures and cracks in the surface rocks could respond to the changes in lake elevation but would be localized to the immediate vicinity of the lake/soil interface, not affecting the groundwater levels or concentration. Groundwater movement through soils is very slow and the aquifer would barely start to respond to changes in recharge elevation before the reservoir would be refilled to elevation 1565 feet by September 10. These small changes in recharge rates as a result of the Action Alternative would likely have no measurable change in the groundwater quality.

Visual Quality

No Action Alternative

The visual quality of the Banks Lake area would not be affected.

Action Alternative

The visual quality of the Banks Lake drawdown would have a minimal additional effect because of the predominance of visual impacts of the Grand Coulee surrounding the lake.

Air Quality

There would be no adverse impacts to air quality in either the No Action or the Action Alternatives.

Soils

No Action Alternative

All drawdown scenarios would be so gradual (less than 2 feet per day) that they would not adversely affect the soils in the study area. Impacts would be limited to erosion from exposed soils left between elevation 1570 feet and the water surface or from wave and ice impacts at the waters surface. According to the refill configuration used, that elevation may be anywhere between elevation 1570 feet and 1565 feet. Such activities in previously undisturbed areas would cause mechanical disturbance to the soil surface and destruction of the protective vegetative cover, including vascular plants and soil stabilizing microbiotic soil crusts.

These disturbances often lead to soil aggregate destruction and channel formation. Destruction of vegetation and disturbance of spawning beds caused by erosion would continue regardless of the surface elevation of the lake but the zone of erosion would take place at the surface elevation. This would allow redeposition of soils during the spring and summer to fill erosional areas developed during the time of drawdown and help to maintain the current high water shoreline. This would maintain a more stable lake bottom from elevation 1570 to elevation 1565.

The most severe soil resource effects are expected to continue on those portions of the shoreline located south of the Million Dollar Mile North Boat Launch, on the south half of the Steamboat Rock peninsula, at Barker Flat, at Kruk's Bay/Airport Bay, and in the upper (north) portion of Banks Lake.

Action Alternative

Similar to the No Action Alternative, all scenarios of drawdown in the Action Alternative are less than the maximum of 2 feet per day that it is believed would cause failures in the shoreline of Banks Lake. As all scenarios also refill the reservoir to elevation 1565 by September 10, there would be no additional adverse effects on soils from the Action Alternative.

Social Environment and Public Health

This section describes the environmental consequences to the social environment and the potential impacts of mosquitoes to public health.

Social Environment

No Action Alternative

For some, as operation of Banks Lake would not change, values would not be affected. For others who value increased water for endangered salmon runs, their values would not be upheld.

Action Alternative

Impacts to recreation, the local economy, power production and power rates are discussed in the Economics section. While recreation opportunities may minimally decline at Banks Lake during the period of drawdown, other opportunities for water-based recreation are nearby. Recreating individuals with strong emotional ties to Banks Lake would be most adversely affected. Overall impacts to the Grant County economy are expected to be negligible. While lost income for some businesses can negatively affect their financial viability, the degree of impact would depend in part upon their ability to adapt their facilities to the lower lake levels in August. Those who are not able to adjust to a loss of income or are unable to adapt their facilities would be most adversely affected. Power production and power rates should not be significantly adversely affected.

The social values of those who desire increased water for endangered salmon runs would be upheld.

Public Health—Mosquitoes

No Action Alternative

Under current historical reservoir operations, August surface elevations of Banks Lake are lowered from a maximum water surface elevation of 1570 feet to a minimum elevation of 1565 feet. Reservoir drawdowns that occur in late summer likely have negative impacts to mosquito production.

Withdrawal of water from vegetated shoreline would decrease mosquito populations and mitigate against any potential production from drawdown pools. Colonization of isolated pools in August occurs at a time when egg production by females is low and the time needed to achieve multiple generations, which would lead to high adult densities, is unavailable. In many cases, the combination of sparse vegetation along with the presence of fish would decrease opportunities for mosquito colonization of newly formed pools. August is also the time of year when rapid evaporation of pools would take place because of high air temperatures.

Mosquito control that is undertaken by local authorities to minimize West Nile Virus infection in humans would take place early in the season. Therefore, only a minimal number of adults would be present for potential use of drawdown areas.

Types and abundance of mosquitoes potentially associated with the drawdown could be documented. Often mosquitoes that are assumed to come from a wetland or ponded water in an impoundment originate elsewhere. However, a review of the topography described below states few ponding areas were evident in the Banks Lake pool. There is ponded water below Dry Falls Dam that would not be affected by either alternative.

Refill of the reservoir in September would, of course, flood vegetated shorelines and allow for potential mosquito production. The limited amount of time left in the season would likely limit mosquito populations. Mosquitoes that were produced would likely be flood-water mosquitoes (e.g., *Aedes*) and not the *Culex* species typically associated with West Nile Virus.

Action Alternative

Under the Action Alternative, the water surface elevation would be drawn down to elevation 1560 feet. Concern has been expressed that this change would result in increased habitat for mosquitoes and would enhance the spread of West Nile Virus. Reclamation identified the potential ponding areas by reviewing historic topography maps prepared in July, 1950, by R. W. Tipton. The topography was created in 2-foot contour intervals. In the drawdown area, little or no shallow ponding areas were evident.

As stated in the No Action alternative, reservoir drawdowns that occur in late summer likely have negative impacts to mosquito production. The later refill period associated with the Action Alternative would likely further limit mosquito production from the vegetated margins of the reservoir. See the No Action Alternative for additional information.

Cumulative Impacts

Cumulative impacts are impacts on the environment that result from the incremental consequences of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes these actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Those projects described in Chapter 1 under Other Related Actions and Activities may add to cumulative impacts to these resources.

Aquatic Macrophytes/Riparian Vegetation

Implementation of the Banks Lake RMP (Reclamation 2001) is expected to enhance shoreline vegetation. The RMP includes several actions, such as the closure of several roads that currently impact the shoreline, reduction of indiscriminate dispersed camping, active invasive vegetation control, more controlled grazing, and active vegetation management that are expected to improve the conditions of riparian habitat at Banks Lake. These actions would tend to offset some of the impacts associated with the potential 10-foot drawdown as disturbance associated with the drawdown is offset by the elimination of other disturbances to shoreline vegetation.

The Bass Anglers Sportsman Society (BASS) Federation of Washington State submitted to Reclamation and the State a plan to restore and enhance shoreline vegetation and to provide subsurface structure to enhance the survival of fish fry in Banks Lake. The plan has been accepted by Reclamation and the State, and several of the projects outlined in the plan have been started. Implementation of this plan will likely have a beneficial impact on shoreline vegetation.

Fish and Wildlife

Among the goals of the Banks Lake RMP (Reclamation 2001) is the improvement and maintenance of fish and wildlife habitat. The RMP did not address any specific improvements to fish habitat but attempted to ensure that human actions did not detract from primary spawning habitat for fish. A number of actions involved in the RMP are directly related to improving and maintaining the terrestrial habitat for a variety of species. As an example, the limiting of dispersed camping to designated sites should concentrate human impacts to fewer areas. The potential 10-foot drawdown is not anticipated to affect any of the improvements or maintenance items outlined in the RMP.

The BASS Federation plan addresses both underwater structure and shoreline vegetation with the goal of improving the fish habitat within Banks Lake. By making slight changes to the location of the underwater structure and the selection of vegetation, the potential 10-foot drawdown should not affect the positive aspects of the BASS plan.

Recreation

Historically, elevation changes to Banks Lake affect the availability of recreational resources surrounding the lake. Banks Lake is recognized locally and regionally for its diverse and outstanding recreational opportunities. These opportunities exist throughout the area for camping, swimming, boating, picnicking, and other recreational pursuits under the No Action Alternative.

Nineteen developed recreation areas are currently provided by a variety of public agencies and private entities. These areas are served by a wide range of developed day and overnight recreation sites and facilities, and generally are concentrated at the south and northeast ends of the reservoir. Of the 19 developed recreational areas, 12 maintain usable boat launches. Drawing the lake down lower than 1565 feet would negatively affect some recreational facilities and operations on the lake.

No other activities in the area are expected to adversely impact the recreational facilities around Banks Lake.

Anadromous Fish

Action 14 of the NMFS BiOp (NMFS 2000) is flow management in the mainstem Columbia River and in the lower Snake River as a measure to improve the survival of ESA-listed salmon. NMFS specified a flow of 200,000 cfs at McNary Dam during the July to August period; however, this target is not always achieved. To supplement flows during August, the action agencies would release water from a number of sources, including Banks Lake. While individually not significant in the overall flow of the Columbia River, the contribution to McNary flows by Banks Lake water, in combination with water from other sources, would make it possible to meet flow objectives in a larger number of years.

Total augmentation water from all sources within the Columbia River basin is more than 5 million acre-feet, including the Canadian projects. In combination, these augmentation sources during the first half of August meets target flows 42 percent of the time and during the second half of August meets target flows 12 percent of the time. Without the combination of augmentation flows, August flow objectives are never met.

The flow objectives at McNary Dam would not be met in any year during either August period without the combined summer flow augmentation. The additional 127,200 acre-feet from Banks Lake would comprise less than 6 percent, on average, of the combined flow augmentation provided in August from Libby, Hungry Horse, Grand Coulee, Dworshak, the upper 5 feet of Banks Lake, the upper Snake, and Brownlee reservoirs.

Unavoidable Adverse Impacts

Unavoidable adverse impacts are long-term impacts to resources that would be affected by implementation of the action. Unavoidable adverse impacts are expected to occur to nine fish species directly as juveniles would be subject to increased predation as a result of the August drawdown. While the overall structure and function of the aquatic macrophyte community that serves as spawning and nursery habitat for many of the fish species in Banks Lake will remain unchanged, unavoidable adverse impacts will occur to drought intolerant plant species resulting in a reduction of species diversity. Seedlings of drought intolerant riparian species such as black cottonwood may be adversely affected during drawdowns.

The Federal Columbia River Power System annually experiences an 8,000 MWh loss under the No Action Alternative when compared to keeping Banks Lake full. Under the Action Alternative, there would be an additional loss of about 8,000 MWh. Under the Action Alternative, the PUD powerplants would experience additional losses of 6,248 MWh to 6,906 MWh annually and the GCPHA would experience additional losses of 812 MWh to 1,695 MWh annually.

The Action Alternative would adversely affect at least one business because access to the lake would be limited in that area. Some recreation uses would change as the lake elevation lowered for August and until it was refilled to at least elevation 1565 feet.

Relationship Between Short-Term Uses and Long-Term Productivity

This analysis examines the relationship between short-term uses of environmental resources and the maintenance and enhancement of long-term productivity.

Compared to the No Action Alternative, the Action Alternative would reduce pumping to Banks Lake by 127.2 thousand acre-feet (kaf) and increase Columbia River flows in August. The resulting reduction in Banks Lake water surface from elevation 1565 feet to 1560 feet would result in temporary adverse effects by making boat ramps, mooring docks, and shallow channels unusable. Swimming beaches may also be unusable during the lower water surface elevations. These impacts would most likely result in decreased visitors to the lake in August and early September. However, Reclamation proposes to mitigate these impacts by extending the boat ramps, modifying the mooring docks, dredging deeper channels, and modifying or changing the location of the swimming beaches. Therefore, these impacts should not affect the long-term recreational use of the lake.

The Banks Lake water would be used to augment the flows in August. This flow objective is intended to primarily benefit ESA-listed Snake River fall chinook salmon, although these flows also are likely to benefit the non-listed Hanford Reach fall Chinook populations. The Snake River fall chinook juvenile migration tends to peak in the second half of July with numbers tapering off through August. Nearly half of the Snake River fall chinook can be transported from the Snake River collector dams and may not benefit from flow augmentation through McNary Dam to the Bonneville reach of the Columbia River. However, even barged fish may benefit from flow augmentation from Bonneville Dam to ocean entry. In addition, there is some uncertainty surrounding flow augmentation benefits for fish survival. Snake River fall chinook is one species that appears to have a stronger flow survival relationship, although that survival relationship is also influenced by water temperature and turbidity. It is anticipated that the additional August flows would enhance the survival of listed Snake River fall chinook populations.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments are decisions affecting renewable resources such as soils, wetlands, and riparian areas. Such decisions are considered irreversible, because their implementation would affect a resource that has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or because they would cause the resource to be destroyed or removed.

Irretrievable commitments of natural resources occur when a decision causes a loss of production or use of resources. They represent opportunities foregone for the time that a resource cannot be used. The primary impacts that would be irretrievable are those that involve physical processes and resources, such as water storage. Under the Action Alternative, a maximum of 127,200 acre-feet of water may be kept out of the reservoir and left in the Columbia River during August. In such circumstances, water for some of the available recreational uses in the reservoir would be lost to water used for the benefit of anadromous fish. However, during certain conditions when Reclamation’s operational and other needs may require that the water remain in the reservoir, existing recreational uses of the reservoir would not be irretrievably lost.

The loss of the water during the month of August and part of September would affect some vegetation and some power production. Under the Action Alternative, 8,000 MWh of energy generation would be irretrievably lost.

Chapter 5

Consultation and Coordination

This chapter describes Reclamation's public involvement and consultation and coordination activities to date, as well as future actions that will occur during the processing of this document.

Public Involvement

Public involvement is a process where interested and affected individuals, organizations, agencies, and governmental entities are consulted and included in Reclamation's decision making process. In addition to providing information to the public regarding this draft environmental impact statement, Reclamation solicited responses regarding the public's needs, values, and evaluations of the proposed alternatives. Both formal and informal input have been encouraged and used.

This section on public involvement also serves as the public involvement summary report for this action.

Scoping Process

An early and open scoping process is required as part of the environmental impact statement (EIS) preparation (49 Code of Federal Regulations [CFR], Part 1501.7). Scoping, as defined in the CEQ regulations of 1978, is "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." The scoping process helps to:

- Identify issues, concerns, and possible impacts
- Identify existing information sources
- Develop alternatives

On April 25, 2001, Reclamation published in the Federal Register a Notice of Intent to prepare an EIS to evaluate impacts of altering existing operations at Banks Lake to provide for an annual August drawdown of up to 10 feet from full pool and to hold a public scoping meeting in the local area.

Reclamation notified potentially interested parties about the Banks Lake Drawdown EIS scoping process and provided opportunities to comment. A meeting notice describing the EIS, requesting comments, providing a return postage paid envelope, and announcing the date, time, and location of the public scoping meeting was mailed to over 300 potentially interested individuals, groups, and governmental agencies. Reclamation also provided a news release about the scoping meeting to area media.

Grant County Board of Commissioners requested that Grant County be granted cooperating agency status in completing the environmental impact statement. A Memorandum of Agreement formalizing the county's role as a cooperating agency was never finalized; however, several meetings were held with the county and the county provided specific economic data for use in the environmental impact statement. They also reviewed and commented on the environmental impact statement, both in writing and at the public hearings.

Public Scoping Meeting

Reclamation held a scoping meeting the evening of Tuesday May 15, 2001, in Coulee City, Washington. Reclamation presented background information and described preliminary alternatives being considered for the drawdown of Banks Lake and provided opportunities to ask questions, identify issues and concerns associated with the preliminary alternatives, or identify other alternatives for the drawdown. About 55 people attended the meeting. Oral comments were recorded on flip charts. Comment sheets and postage-paid return envelopes were provided.

In addition to comments received at the meeting, a total of 34 written comment sheets and letters were received in time to be included in the scoping summary document (Reclamation, Scoping Summary, 2001). Copies of the scoping summary were mailed to those on Reclamation's mailing list for this study. The scoping summary is included in this EIS as appendix B.

The nature of the comments ranged from brief comments or questions to very detailed statements. The issues identified during this process have been considered throughout the discussion of the affected environment and environmental consequences.

Some comments concern actions or issues that are outside the scope of this EIS. These are valid concerns, but they do not address the purpose of this action or they relate to other actions not a part of this EIS. The EIS technical team considered and used the remaining comments as appropriate to prepare the EIS.

Key issues centered on:

- Evaluating a full range of alternatives

- Ensuring irrigation water supply and delivery, particularly in water-short years

- Determining impacts to infrastructure—lakebed power lines, lakeside roadway foundations

- Protecting water quality

- Identifying impacts on fish and wildlife, including habitat and reservoir elevations

- Addressing threatened and endangered species issues

- Identifying impacts to habitat, including noxious weeds and riparian habitat

- Determining how recreation such as fishing and boating would be affected during drawdown by the various alternatives

- Ensuring the public is safe from boating and fire hazards during drawdown

- Identifying impacts to power production and operation

- Protecting cultural resource sites

- Ensuring continued stability of the local economy, including the recreation service sectors

Publics were divided on the drawdown. Some supported the drawdown to ensure water supplies for salmon because they believed the benefit would outweigh negative impacts to anything else. Others opposed the drawdown because they believed adverse economic impacts to the local area would be greater than the benefit to salmon.

Some comments were outside the scope of the EIS because they were not related to the purpose of the project. The project purpose is to evaluate impacts of an additional 5 foot drawdown at Banks Lake during August, in response to Action 31 of the NMFS December 2000 FCRPS BiOp.

Comments outside the scope of the EIS included:

- Stopping salmon fishing
- Drawing down Lake Roosevelt instead of Banks Lake
- Monitoring the effectiveness of the additional water
- Increasing fish stocking at other lakes
- Providing demonstrated scientific basis for the additional water

Public Hearings and Review of Draft EIS

The Draft Environmental Impact Statement (DEIS) was filed with the Environmental Protection Agency (EPA) on January 6, 2003. A Notice of Availability and Public Hearings appeared in the *Federal Register* January 9, 2003. A news release announcing availability of the DEIS and dates, times, and locations of public hearings was sent to area media. Comments were scheduled to be received for 60 days until March 10, 2003.

Approximately 375 copies of the Draft EIS were distributed to Federal, State, and local agencies, native American tribes, irrigation districts, and interested members of organizations and the general public. The original 60-day comment period was extended 30 days from March 10 to April 11, 2003, at the request of the East Columbia Basin Irrigation District. Notice of the comment period extension was published in the *Federal Register* on March 17, 2003. A letter announcing the extension was mailed on March 4, 2003, to everyone who was sent a copy of the Draft EIS. A news release announcing the extension of the comment period was sent to area media.

In addition, two private groups placed advertisements and comment forms in local newspapers, requesting comments be provided to Reclamation. Local private petitions were also distributed for signature stating opposition to the drawdown. About 275 signatures were affixed to the petitions.

A formal public hearing was conducted the afternoon of February 11, 2003, in Coulee City, Washington, and the evening of February 12, 2003, in Moses Lake, Washington. Eleven speakers gave formal oral testimony at the first public hearing, and three gave testimony at the second public hearing. Twenty-five entities and individuals provided written public hearing comments that are included in the hearing record. The public hearing record is available for public review at Reclamation's Upper Columbia Area Office in Yakima, Washington; in the Ephrata Field Office in Ephrata, Washington; and in the Pacific Northwest Regional Office in Boise, Idaho.

The public hearing testimony and written public hearing comments are summarized below.

Economic impact—Economic impact to the local community "is not negligible." Impacts will occur not only to the individual businesses and indirect sales when tourists stay away, but also to the revenue for community services and the local school system. Tourism keeps the communities near Banks Lake alive in the summer.

Economic impact to hydropower—Net reductions in hydropower generation at Grand Coulee and at Coulee City as a result of the drawdown could be significant and could be as much as $1.5 million annually.

Recreation—Recreation access would be devastated. All boat launches in Banks Lake would be useless except for two; swimming and fishing access would be cut off or very limited.

Flow augmentation—The National Marine Fisheries Service says the Banks Lake drawdown has uncertainty surrounding the success of flow augmentation for fish survival. Adequate justification that the drawdown would benefit the endangered species in the lower portion of the Columbia River has not been provided.

Salmon value—The alternative appears to be another example of sacrificing a rural community for the endangered species. The salmon runs over the past couple of years have been at record levels.

Irrigated agriculture—Farmers everywhere are concerned with some of the heavy-handed actions of NOAA Fisheries and irrigation curtailments in other areas. The reliability of our water supply is our primary concern.

Visual quality—The last drawdown caused fish to die in muddy ponds, exposed mud flats, muddy water halfway across the lake, and huge dust storms as mud flats dried, as well as a 2,500 acre "bathtub ring" around the lake. We do not wish this to happen yearly.

Health and safety—A lake drawdown would create an odor problem as well as add to the mosquito population and become a breeding ground for mosquitoes that could harbor the West Nile Virus.

Health and safety, lake navigation—If you could actually get your boat into the water, navigation on the lake would be unsafe for both property and people because of exposed rocks and tree snags.

Vegetation—Any significant change in the lake elevation would adversely affect groundwater levels during the growing season. Lower groundwater levels, in turn, has a potential to adversely affect the vegetation communities, including marshy areas around the edge of the lake, which now exhibit an abundance of birds and other animals.

Social environment—The National Environmental Policy Act not only requires the Federal Government to consider the impact of the actions on the environment but also to preserve culture, heritage, and customs. This action would negatively affect the customs and culture in the community. The drawdown would cause the community to lose the use of the lake, which would affect their quality of life.

Environmental justice—Environmental justice addresses the fair treatment of people of all races and incomes; no group of people should bear a disproportionate share of negative impacts from an environmental action. However, Grant County has 15 percent of the people who live below the poverty level compared with 10 percent for the State as a whole.

Alternatives and mitigation—The No Action Alternative still means that some water (5 feet of drawdown) could contribute to the flow and help with the salmon migration at McNary Dam. We're not saying no water for mitigation, because that would happen. However, some oppose both the No Action and Action Alternatives.

State responsibility—State of Washington Salmon Recovery Act of 1998 says the State should "retain primary responsibility for managing the natural resources of the State…."

Cooperating agency—A request for cooperating agency status by Grant County had not been granted.

Procedural flaws —the 5-foot drawdown really is not the No Action Alternative; the Banks Lake operations before 2000 should be considered no action.

A total of 141 written review comment documents were received during the 90-day public review period January 6, 2003, to April 11, 2003. These documents and Reclamation's responses to the comments are included in the Comments and Responses volume of this final EIS.

Reclamation's practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that Reclamation withhold their home address from public disclosure, which were honored to the extent allowable by law. There also may be circumstances in which Reclamation would withhold a respondent's identity from public disclosure, as allowable by law. Reclamation will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

A record of decision can be issued no sooner than 30 days after EPA issues its notice that the EIS is available for review.

Coordination and Consultation

Endangered Species Act

In accordance with Section 7(c) of the Endangered Species Act of 1973, Reclamation requested from the Fish and Wildlife Service (Service) a list of threatened and endangered species, candidate species, and species of concern potentially found in the Banks Lake drawdown study area (May 2001). Reclamation determined that the proposed project may affect, but is not likely to adversely affect, the bald eagle, and would not affect any other listed species. The Service has sent Reclamation a letter of concurrence, dated April 3, 2003.

This analysis was done in compliance with Action 31 of the Reasonable and Prudent Alternative under the December 2000 Biological Opinion issued by the National

Marine Fisheries Service (NMFS) (currently National Oceanic Atmospheric Administration [NOAA] Fisheries) for operation of the Federal Columbia River Power System. Therefore, additional ESA consultation with NMFS is not necessary.

Fish and Wildlife Coordination Act

In accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 USC 661 et seq.), the Service provided a final Coordination Act Report documenting wildlife resources, habitat, and management concerns within the drawdown study area (Service 2002) to assist in developing this document. The final Coordination Act Report is attached as appendix A.

If the Action Alternative is implemented, Reclamation will implement the following recommendations contained in the Coordination Act Report:

- Some mitigation actions for various adverse impacts (existing and potential future impacts) could include the establishment of native riparian vegetation in various areas of the drawdown zone, such as native bunchgrasses and forbs in shrub-steppe and riparian vegetation along the shorelines. The limited time frame of this drawdown may limit the logistical feasibility of this mitigation.

- If the 10-foot drawdown is implemented, Reclamation should ensure timely refill of Banks Lake up to 1565 feet by early September to ensure operation of net-pens.

- Reclamation shall work collaboratively with the WDFW and the Service to develop studies that would examine the effects or lack of effects of the proposed drawdown on rearing fish species in Banks Lake.

- The Service recommends Reclamation develop a short-term plan that would address potential modifications of current boat ramp and moorage facilities in order to facilitate summer use activities.

- Reclamation should ensure that a complement of riparian vegetation be maintained along the Banks Lake drawdown zone and that conditions should be sufficient to provide for short-term input of nutrients into the water column as Banks Lake approaches its refill goal.

- A study to determine the reproductive success of western grebes in the study area should be initiated to help determine the level of management that should be applied to protect these birds in light of the proposed drawdown.

- Hatchery compensation via the WDFW is an option that Reclamation should pursue if lack of recruitment for certain fish populations is linked to the proposed drawdown.

- Protection of habitat, such as shrub-steppe, from fire is important, in this and region because it does not recover quickly from fire. Attempts should be made to ensure shoreline access to water resources in the event of uncontrolled wildfire in these designated shrub-steppe areas.

- Updating the GIS [geographic information system] work that was done at Banks Lake by Reclamation would be valuable. Aside from changes that will occur over time, this would allow some of the errors the Service identified in its 1998 Planning Aid Memorandum (U.S. Fish and Wildlife Service 1998) to be corrected and a more accurate vegetation map to be generated to determine potential wetland impacts linked to the drawdown and concurrent management actions.

- Reclamation should initiate studies to examine the potential effects of the drawdown on wildlife species.

The following are the CAR recommendations that Reclamation would not agree to for the reasons provided.

- The Bureau of Reclamation should designate a minimum operating level for Banks that allows for feasible operation of net-pen operations at the north and south ends of Banks Lake.

  Reclamation retains the ability to operate the reservoir at any elevation that allows for complete delivery of water to CBP irrigators. This minimum elevation would not allow for operation of the net pens. However, Reclamation will attempt to maintain an elevation in Banks Lake that allows for operation of the net pens.

- Funding should be provided for improvement of existing net pens, including structures to eliminate depredation by birds if "Action" Alternative B is selected.

  Reclamation will not provide funding to private endeavors utilizing the reservoir for rearing of fish. While Reclamation issued permits for the operation of the net pens, the sole operation risk is with the groups operating the pens.

- If 10-foot drawdown is extended into the early spring season of 2003, Reclamation shall ensure that both net-pen operations at the north and south ends of Banks Lake will be moved to an ideal operation location before September 2002.

  No refill scenario being considered leaves Banks Lake below 1565 past the middle of September. During those years when maintenance needs of the reservoir facilities requires an extended drawdown and overwinter retention of the lower elevation, Reclamation will not assist with the relocation of the net pens. However, Reclamation will inform the operators of the net pens when such maintenance drawdowns will occur so that operation of the pens can be suspended at that time.

- The high value of the Devil's Punch Bowl area to several migratory bird species and the close proximity of a significant amount of recreation pressure undoubtedly leads to adverse impacts to sensitive habitats and disturbance to these species. Actions should be included, for the "No Action" and "Action" alternatives, which provide some level of protection to species using this area, at least during nesting and rearing seasons.

  The Action alternatives have slight negative affects on recreation, potentially reducing recreation pressure as outlined in the recommendation. This reduction would be limited to a short period in August/September, so most likely would not affect nesting but could reduce disturbance during the rearing period. To a large extent, the recreational activities which result in the impacts of concern are outside of the scope of this EIS. While the recreational activities may affect species using the Devil's Punch Bowl, they are better addressed in management plans that have been developed by the managing agencies, including implementation of the recently completed Resource Management Plan for Banks Lake (Reclamation 2001).

- Surveys for pygmy rabbits should be done in specific areas within shrub-steppe communities to address the potential of increased public use that has been diverted away from Banks Lake due to the drawdown.

  Reclamation has determined that the drawdown will not affect public use of the lands around Banks Lake, and therefore, will not affect potential pygmy rabbit habitat in the Banks Lake area.

- Restrictions on the use of PWC during fish spawning seasons in certain areas could benefit several fish species where spawning habitat has become limited due to the proposed drawdown.

  It is not anticipated that spawning areas will be limited due to the drawdown. Reclamation addressed the question of restrictions on personal watercrafts in the development of the Banks Lake Resource Management Plan and concluded that Reclamation has no authority to regulate watercraft in the State of Washington.

- Impacts of the several fishing tournaments at Banks Lake on fisheries should be determined and tournaments modified or curtailed, if necessary to facilitate spawning events.

  Fishing tournaments and their regulation are the responsibility of the Washington State Department of Fish and Wildlife. Reclamation has no authority to regulate the timing, extent or number of tournaments.

- Additional Ute ladies'-tresses surveys should be conducted at the two perennial streams which enter Banks Lake from the northwest and some of the springs and seeps within the immediate vicinity to determine potential impacts to this plant from the proposed drawdown.

The drawdown will not affect any wet area where this species might exist. Additional surveys will be completed as part of the overall management of Banks Lake under current programs Reclamation has in place.

- Reclamation should use all available techniques to eliminate water milfoil if proposed drawdown is implemented. Do not use control methods that would result in negative impacts to desirable submergent, aquatic plants and aquatic invertebrates.

  The extent of drawdown in the "Action" alternative is not lengthy enough to affect Eurasian water milfoil. It is not anticipated that this drawdown will effect the amount or extent of the milfoil infestation in the reservoir, nor are there known techniques available for such control. Future deeper drawdowns for maintenance purposes, where the level of the reservoir is reduced throughout the winter will most likely have some effect on milfoil but short duration drawdowns do not.

National Historic Preservation Act

Consultation under Section 106 of the National Historic Preservation Act occurs in two stages with the Washington State Historic Preservation Office and Indian Tribes with traditional territory in and adjacent to the project area. These Tribes are the Confederated Tribes of the Colville Indian Reservation, Yakama Nation, and Spokane Tribe of Indians. The first stage is the consultation that occurs upon transmitting notification of the undertaking, which the draft EIS accomplished. The second stage occurs when the report resulting from the surveys called for in the chosen alternative is forwarded for review and comment. If historic resources are identified that would experience adverse effects from the preferred alternative, additional consultation to resolve the effects is done with the Advisory Council on Historic Preservation.

Tribal Consultation

In May 2001, Reclamation sent letters to the Chairs of the Confederated Tribes of the Colville Reservation (CCT), the Spokane Tribe of Indians (Spokane Tribe), and the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) inviting them to attend the scoping meeting in Coulee City or to send comments in writing. At the request of CCT, Reclamation staff met with the CCT staff to discuss their specific comments.

The draft EIS was sent to the CCT, the Spokane Tribe, and the Yakama Nation, with an offer to meet with each tribe and a promise from Reclamation to call to determine if such a meeting was desired. Calls to the Chairs of the CCT and Spokane Tribe elicited directions to their respective staffs to both call Reclamation and to formally respond to the draft EIS with comment letters. These letters and responses are included in the Comments and Responses volume of the EIS. The Yakama Nation was visited by Reclamation staff and a letter of comment was received from them after the end of the comment period. In a letter of reply to the Yakama Nation, Reclamation again extended an invitation to request a meeting. Copies of tribal correspondence are included in appendix D.

Additional consultation with tribes may occur if their review of the EIS raises the need to clarify and discuss specific issues or actions on a government-to-government basis.

Distribution List

The draft environmental impact statement was sent to about 375 agencies, groups, and individuals for their information and review. The final EIS or its summary is being sent to the distribution list, shown below. All groups and individuals who submitted written comments or who made comments at the public hearings also receive a copy, unless they indicated otherwise on a self-addressed postage paid reply card.

Federal Agencies (Headquarters Offices)

Advisory Council on Historic Preservation
Department of Energy
- Bonneville Power Administration

Department of the Interior
- Bureau of Indian Affairs
- Bureau of Land Management
- Fish and Wildlife Service
- Geological Survey
- Minerals Management Services
- National Park Service
- Natural Resources Library
- Office of Environmental Policy and Compliance

Environmental Protection Agency

U.S. Congressional Delegation

United States Senate
- State of Washington
  - Honorable Maria Cantwell
  - Honorable Patty Murray

House of Representatives
- State of Washington
  - Honorable Doc Hastings, 4th District

All locations below are in the State of Washington, unless otherwise noted.

Indian Tribes

Burns Paiute Tribe, Burns, Oregon
Coeur D'Alene Tribe, Plummer, Idaho
Confederated Salish and Kootenai Tribes, Pablo, Montana
Confederated Tribes of the Colville Reservation
Confederated Tribes of the Umatilla Indian Reservation, Pendleton, Oregon
Confederated Tribes of the Warm Springs Reservation, Warm Springs, Oregon
Kalispel Tribe, Usk
Kootenai Tribes of Idaho, Bonners Ferry, Idaho
Nez Perce Tribe, Orofino, Idaho
Shoshone-Bannock Tribes of Fort Hall, Fort Hall, Idaho
Shoshone-Paiute Tribes of the Duck Valley Reservation, Owyhee, Nevada
Spokane Tribe of Indians, Wellpinit
Yakama Nation, Toppenish

Washington State Legislature

Representative Mike Armstrong, 12th District, Olympia
Representative Cary Condotta, 12th District, Olympia, Wenatchee
Senator Linda Evans Parlette, 12th District, Olympia
Representative Bill Hinkle, 13th District, Olympia
Representative, Janéa Holmquist, 13th District, Olympia
Representative Joyce Mulliken, 13th District, Ephrata, Olympia

Federal Agencies—Regional and Local Levels

Department of the Army
- U.S. Army Corps of Engineers, Portland, Oregon

Department of Commerce
- NOAA Fisheries Service, Portland, Oregon, Seattle

Department of Energy
- Bonneville Power Administration, Portland, Oregon, Seattle
- Federal Energy Regulatory Commission, Portland, Oregon

Department of the Interior
- Bureau of Indian Affairs, Portland, Oregon, Toppenish
- Bureau of Land Management, Wenatchee
- Fish and Wildlife Service, Boise, Idaho, Portland, Spokane, Wenatchee, Vancouver
- National Park Service, Coulee Dam

Environmental Protection Agency, Portland, Oregon, Seattle

State and Local Government Agencies

State of Alaska
- Department of Fish and Game, Juneau, Alaska

State of Idaho
- Department of Fish and Game, Boise, Idaho
- Idaho Power Council, Boise, Idaho

State of Montana
- Department of Natural Resources, Helena

State of Oregon
- Department of Environmental Quality, Portland
- Department of Fish And Wildlife, Portland
- Governor, Salem
- Portland State University, Portland
- Public Power Commission, Portland

State of Washington
- Department of Ecology, Olympia, Spokane
- Department Fish And Wildlife, Ephrata, Olympia
- Department of Natural Resources, Ellensburg, Olympia
- Department of Transportation, Wenatchee
- Governor, Olympia
- Office of Archaeology and Historic Preservation, Olympia
- Parks and Recreation Commission, Electric City, Wenatchee
- Potato Commission, Moses Lake

Chelan County
- Public Utility District, Wenatchee

City of Warden
- Mayor, Warden
- Port District No. 8, Warden

Douglas County
- Board of Commissioners, Waterville
- Transportation & Land Services, East Wenatchee
- Public Utility District #1, East Wenatchee

Ferry County
- Natural Resource Board, Republic

Franklin County
- Board of Commissioners, Pasco

Grand Coulee Project Hydroelectric Authority, Ephrata

Grant County
- Board of Commissioners, Ephrata
- Department of Health, Ephrata
- Port District No 4, Coulee City
- Public Utility District No. 2, Ephrata
- Tourism Commission, Ephrata

South Banks Lake Mosquito Control District #3, Coulee City

Town of Coulee City, Coulee City
Council, Coulee City
Mayor, Coulee City
Port District #4, Coulee City

Irrigation Districts

Black Sands Irrigation District, Ephrata
East Columbia Basin Irrigation District, Othello
Quincy Columbia Basin Irrigation District, Ephrata, Soap Lake, Quincy
South Columbia Basin Irrigation District, Pasco

Libraries

Bridgeport Community Library, Douglas County, Bridgeport
Coulee City Community Library, Coulee City
Des Moines Library, Des Moines
East Wenatchee Community Library, Douglas County, East Wenatchee
Ephrata Public Library, Ephrata
Grand Coulee Community Library, Grand Coulee
Moses Lake Public Library, Moses Lake
Quincy Community Library, Quincy
Royal City Community Library, Royal City
Seattle Public Library, Seattle
Soap Lake Community Library, Soap Lake
Warden Community Library, Warden
Wenatchee Public Library, Chelan County, Wenatchee

Interested Organizations

American Rivers, Seattle
American Rivers, et al, Portland, Oregon
Big Bend Bass Masters, Moses Lake
Big Bend Economic Development Council, Moses Lake
Central Basin Audubon Society, Moses Lake
Central Washington Bass Club, Wenatchee
Columbia Basin Environmental Council, Soap Lake
Columbia Basin Fish and Wildlife Authority, Portland
Columbia Basin Walleye Club, Union Gap
Columbia River Inter-Tribal Fish Commission, Portland, Oregon
Coulee City Chamber of Commerce, Coulee City
Grand Coulee Dam Area Chamber of Commerce, Grand Coulee
Grant County Economic Development Council, Moses Lake
Idaho Rivers United, Boise, Idaho
Idaho Water Users Association, Inc., Boise, Idaho
Moses Lake Area Chamber of Commerce, Moses Lake

National Wildlife Federation, Seattle
Natural Resources Defense Council Inc, New York, New York
Northwest Council of Governments & Associates, Soap Lake
Northwest Power and Conservation Council, Helena, Montana; Olympia; Portland, Oregon; Spokane
Northwest Sportfishing Industry Association, Oregon City, Oregon
Pacific Northwest Waterways Association, Portland, Oregon
Promoters of Wildlife and Environmental Resources, Electric City
Quincy Valley Chamber of Commerce, Quincy
Saint Andrews Grange No. 832, Coulee City
Save Our Wild Salmon, Portland, Oregon
Soap Lake Conservancy, Soap Lake
Upper Columbia United Tribes, Cheney
Washington Farmers Union, Coulee City
Washington State Bass Federation, Banks Lake Enhancement Project, Wilbur

Interested Entities

Ala Cozy Motel, Coulee City
All Seasons Enterprises, Coulee Dam
Banks Lake Net and Charter, Coulee City
Basic American Foods, Moses Lake
Dick Cason Consulting, Inc., East Wenatchee
Cash Hardware, Coulee City
Central Bean Company, Inc., Quincy
Coulee Playland Resort, Electric City
Coulee City Builders Supply, Coulee City
Davis Farms, Warden
EDAW, Inc, Seattle
Givens Pursley, Boise, Idaho
Idaho Power Company, Boise, Idaho
Jet Farms, Inc., Royal City
Just Another Espresso, Coulee City
Lamb-Weston, Inc., Tri-Cities
Lemargie & Whitaker, Ephrata
Litchfield Consulting Group, Portland, Oregon
Mc Lean Ranches, Coulee City
Mid-Columbia PUD, Fox Island
Montgomery Water Group, Kirkland
Pacificorp, Portland, Oregon
PNGC Power, Portland, Oregon
Prather's Welding & Fabrication, Inc., Coulee City
D. Rohr & Associates, Portland, Oregon
Seattle City Light, Seattle
Sun Banks Resort, Grand Coulee
Al Wright Consulting, Portland, Oregon

Interested Individuals

Anding, Maurice, Coeur D'Alene, Idaho
Argo, Daniel and Angie, Royal City
Austin, Janet and Jake, East Wenatchee
Baird, John, Ephrata
Bell, Keith, Ephrata
Bellah, Glen C. and Roselon, Coulee City
Benoschek, Ken, Soap Lake
Bodenman, Donald, Moses Lake
Bott, Muriel, Pomeroy
Boyer, Julie, Lanette Boyer, Moses Lake
Braun, Blaine, Royal City
Burdick, Pat, Ephrata
Carter, Anne, Ephrata
Certa, Paul, Richland
Chamberlain, Tammi, Ted Ayers, Ephrata
Child, Lynn, Quincy
Coates, Arlene, Coulee City
Copenhaver, Phil and Chris, Moses Lake
Corey, R. L. and J. E., Ellensburg
Crook, Clay, Moses Lake
Crook, Karen Ann, Moses Lake
Dase, Julius, Des Moines
Dick, John R., Othello
Dickinson, Charles F., Soap Lake
Dormaier, Lourence C., Moses Lake
Dormaier, Ruth, Moses Lake
Eilers, Gerald, Royal City
Engelhardt, Sam, Moses Lake
Evans, Brian S., Moses Lake
Evans, Harold, Coulee City
Fitch, Rob and Kathy and Family, Wenatchee
Flint, Tom, Ephrata
Francis, Myrna J., Electric City
Friehe, Berend, Carla, Derek, and Katharina, Moses Lake
Fuller, Kim, Coulee City
Gee, Glendon W, Richland
Gee, Glendon and Shirley, Richland
Gerber, Sue, Moses Lake
Gimmestad, Heath, Moses Lake
Graedel, Bill, Odessa
Graff, Dorothy, Coulee City
Gross, Holly, Othello
Guptill, Joan, Electric City
Hagen, Maynard, Soap Lake
Hastings, Terry, Mattawa

Heiberg, Rich and Wendy, Coulee City
Hemore, Dick, Moses Lake
Hendrickson, Darin, Moses Lake
Hesse, Christopher W., Moses Lake
Holm, Ken, Ephrata
Hopkins, David D., Moses Lake
Howard, Fred "Fritz," Soap Lake
Isaak, Phil, Coulee City
Janett, Craig, Royal City
Jenkins, Jack, Soap Lake
Jones, Karen, Spokane
Jones, V. Joyce, Coulee City
Jorgensen, Keith, Coulee City
Kallenberger, Ken, Royal City
Lake, Susan, Ronan, Montana
Larsen, Mark, Richland
Lefler, W G., Royal City
Lemon, Doug, Port Orchard
Lewis, Kathy and Mark, Wenatchee
Lindholdt, Paul J., Cheney
Marohl, Dale and Cheryl, Coulee City
Martell, Dan, Ephrata
Mast, Ralph R. and Darsilla, Coulee City
Meiners, Brian, Moses Lake
Mianecki, Rick, Royal City
Mills, Hubert P., Spokane
Moody, John Robert, Ephrata
Murray, Sherry L., Moses Lake
Olsen, Lynn, Othello
Padilla, Daniel, Moses Lake
Palko, Mike, Tenino
Paulsson, Alta, Coulee City
Pemmington, Jerry, East Wenatchee
Pitts, Bill and Joann, Coulee City
Poulson, Barbara, Connell
Ramiraz, Juan, Moses Lake
Randall, Jim and Gloria, Coulee City
Rice, Clarence and Phyllis, Coulee City
Riley, M. P., Cedarburg, Wisconsin
Roberts, Wesley J., Coulee City
Sanders, Lynn, Ephrata
Scheibner, Mildred, Coulee City
Schwab, Alene, Stratford
Secrest, Joan, Almira
Sieg, William R., Hartline
Smith, Lisa G., Ellensburg

Sortomme, Thomas W., Ephrata
Sparks, Lloyd, Royal City
Spartveit, Paul, Othello
Steinmetz, Gordon, Coulee City
Theisen, Arnold J., Irrigon, Oregon
Throneberry, Adam, Moses Lake
Tope, Donna and Clarence, Otis Orchards
Umberger, John and Ruth, Methow
Van Dyke, Darrell, Quincy
Webster, Rod, Coulee City
Wesner, Wayne, Almira
West, June M., Anacortes
White, Donald R, Coulee City
Williams, Susan, Coulee City
Wollard, Wayne, Monroe

Media

Columbia Basin Herald, Ephrata
News Standard, Coulee City

List of Preparers

This EIS was prepared by employees in the Pacific Northwest Regional Office, Boise, Idaho; the Upper Columbia Area Office, Yakima, Washington; and in the Technical Service Center, Denver, Colorado. A list of persons who prepared various sections of the statement or participated to a significant degree in preparing the statement is presented below in alphabetical order.

Name	Title	Contribution
Lola Abshire	Regional NEPA Coordinator	NEPA guidance and review
Susan Black	Social Science Analyst	Resource Manager, social environment, environmental justice, public involvement, and scoping process
Jim Blanchard	Special Projects Officer	Overall EIS coordination and descriptions; irrigated agriculture, visual quality, air quality, and soils
Susan Broderick	Fisheries Biologist	Vegetation, fish, and wildlife; and threatened and endangered species
Mark DeLeon	Archaeologist	Historic resources, traditional cultural properties, Native American Sacred Sites, and Indian trust assets
Jim Fodrea	ESA Hydro Coordinator	Guidance and review
Robert George	Technical Specialist in Water Quality	Water quality analysis
Patty Gillespie	Technical Writer-Editor	EIS writer
Dave Kaumheimer	Area Office Environmental Programs Manager	Guidance and review
Rich Lichtkoppler	Natural Resource Economist	Regional/local economic analysis
Joe Lyons	Hydraulic Engineer	Review of hydrology
Ken Manglesen	Technical Specialist in Water Quality	Water quality analysis
Mark Nelson	Research Aquatic Biologist	Public health (mosquitoes)
Tony Norris	Hydrologist	Hydrologic modeling
Lori Postlethwait	Hydraulic Engineer	Review of hydrology and hydropower operations
Stephanie Utter	Land Resource Division Manager	Recreation
Rick Vinton	Economist	Hydropower economic analysis

Glossary

A

acre-foot: A volume of water that would cover 1 acre to a depth of 1 foot (325,850 gallons, 43,560 cubic feet).

affected environment: Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action. Also, the chapter in an environmental impact statement describing current environmental conditions.

alternatives: Courses of action which may meet the objectives of a proposal at varying levels of accomplishment, including the most likely future conditions without the proposed action.

analysis: Examination of existing and/or recommended management needs and their relationships to discover and display the outputs, benefits, effects, and consequences of initiating a proposed action.

aquatic: Living or growing in or on the water.

artifact: A human-made object.

authorization: An act by the Congress of the United States that authorizes use of public funds to carry out a prescribed action.

B

backwater: A small, generally shallow body of water attached to the main canal, with little or no current of its own.

baseline: Condition that would prevail if no action were taken. However, “baseline” is not a term used in NEPA compliance documentation. NEPA analysis is based on future with and without the project. The “No Action Alternative” is considered to be the action most likely to occur in the future without any action alternative being implemented.

benthic: Bottom of lakes or oceans; organisms that live on the bottom of water bodies.

benthos: Organisms living in or on the bottom of a lake, pond, ocean, stream, etc.

biological diversity: Number and kinds of organisms per unit area or volume; the composition of species in a given area at the given time.

biological opinion: Document which states the opinion of the U.S. Fish and Wildlife Service about whether a Federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat.

Critical habitat - Specific areas with physical or biological features essential to the conservation of a listed species and which may require special management considerations or protection. These areas have been legally designated via Federal Register notices.

Jeopardy opinion - U.S. Fish and Wildlife Service or National Marine Fisheries Service opinion that an action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. The opinion includes reasonable and prudent alternatives, if any.

No jeopardy opinion - U.S. Fish and Wildlife Service or National Marine Fisheries Service opinion that an action is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat.

biology: The scientific study of life.

biota: The plant (flora) and animal life (fauna) of a region or ecosystem, as in a stream or other body of water.

C

candidate species: Plant or animal species that are candidates for designation as endangered (in danger of becoming extinct) or threatened (likely to become endangered).

climate: Average conditions of the weather over a number of years.

community: A group of one or more interacting populations of plants and animals in a common spatial arrangement at a particular point in time.

corridor: Narrow strip of land reserved for location of transmission lines, pipelines, and service roads.

cubic feet per second (cfs): A rate of streamflow; the number of cubic feet of water passing a reference point in 1 second.

cultural resource(s): Any building, site, district, structure, or object significant in history, architecture, archeology, culture, or science.

colonial nesting: Species of birds that nest together in proximity.

colonization: The successful establishment of a new habitat by a species.

concentration: Relative quantities of physicochemical parameters. The density or amount of a substance in a solution.

coulee: Long winding channel cut through lava formations. A term primarily used in the northwestern United States.

D

dam: Structure for impounding water.

deposition: Material settling out of the water onto the streambed or lake bed. Occurs when the energy of the flowing water is unable to support the load of suspended sediment.

diversion: A structure in a river or canal that diverts water from the river or canal to another watercourse.

drainage basin: The area of land that drains water, sediment, and dissolved materials to a common outlet at some point along a stream channel. Also see watershed.

E

economic analysis: A procedure that includes both tangible and intangible factors to evaluate various alternatives.

economic evaluation: A procedure or process used to verify good business decisions are being made based on sound economic principles.

ecosystem: Complex system composed of a community of animals and plants as well as the chemical and physical environment.

endemic: Something peculiar to a particular people or locality, such as a disease which is always present in the population.

emergent vegetation: Aquatic plants having most of the vegetation parts growing above water.

endangered species: A species or subspecies whose survival is in danger of extinction throughout all or a significant portion of its range. The ESA supports the recovery of endangered species by mandating conservation of the ecosystems upon which they depend.

entrainment: Process by which aquatic organisms, suspended in water, are moved by water motion involuntarily.

environment: All biological, chemical, and physical factors to which organisms are exposed.

environmental analysis: Systematic process for consideration of environment factors in land management actions.

environmental justice: The fair treatment of people of all races and incomes with respect to actions affecting the environment.

exceedence (water quality): The violation of the pollutant levels permitted by environmental protection standards.

exceedence interval: The average number of years between the occurrence of an event of a given magnitude and one that is more extreme.

exotic species: A non-native species that is introduced into an area.

F

facilities: Structures associated with Reclamation irrigation projects, municipal and industrial water systems, power generation facilities, including all storage, conveyance, distribution, and drainage systems.

facultative wetland species: A plant species that can grow both in and out of wetlands.

flood or flooding: A general condition of partial or complete inundation of normally dry land areas from the overflow of inland and/or tidal water, or unusual and rapid accumulation of surface waters from any source.

flood plain: Land areas adjoining a river or other water course including that area subject to a 1 percent or greater chance of flooding in any given year. The base flood plain shall be used to designate the 100-year plain (1 percent chance flood plain).

flow: Volume of water passing a given point per unit of time.

fry: Life stage of fish between the egg and fingerling stages. Depending on the species of fish, fry can measure from a fraction of an inch to a few inches.

full pool: Volume of water in a reservoir at maximum design elevation.

G

groundwater: (1) Water that flows or seeps downward and saturates soil or rock, supplying springs and wells. The upper level of the saturated zone is called the water table. (2) Water stored underground in rock crevices and in the pores of geologic materials that make up the earth's crust. That part of the subsurface water which is in the zone of saturation; phreatic water.

H

habitat: Area or type of environment where a plant or animal lives.

head: Differential of pressure causing flow in a fluid system, usually expressed in terms of the height of a liquid column (or the vertical distance in feet) that pressure will support.

headwater: The source and upper part of a stream; water upstream of a dam or powerhouse.

hydrology: Scientific study of water in nature—its properties, distribution, and behavior.

I

Indian trust assets: Legal interests in property held in trust by the United States for Indian Tribes or individuals.

indicator: Organism, species, or community that indicates certain environmental conditions.

indigenous: Native to a given area.

indirect impacts: A condition caused by an action through intermediary causal agents. An effect for which the causal linkages to the action are not readily apparent.

irretrievable: Commitments that are lost for a period of time.

irreversible: Commitments that cannot be reversed, except perhaps in the extreme long term.

J, K, L

life cycle: Various stages through which an animal passes through from egg fertilization to death.

life history: Life cycles through which organisms pass, with emphasis on reproduction and survival mechanisms.

littoral zone: Pertains to the shallow water area along the edge of a body of water—shore.

M

macrophytes: Aquatic macrophytes by definition are the macroscopic (that is large enough to be seen with the unaided eye) forms of aquatic and wetlands plants found in the shorelines of lakes or slow-moving reaches of rivers.

maintenance: All routine and extraordinary work necessary to keep the facilities in good repair and reliable working order to fulfill the intended designed purposes.

mitigation (NEPA Measures): Action taken to avoid, reduce the severity of, or eliminate an adverse impact. Mitigation can include one or more of the following:

1. avoiding impacts
2. minimizing impacts by limiting the degree or magnitude of an action
3. rectifying impacts by restoration, rehabilitation, or repair of the affected environment
4. reducing or eliminating impacts over time
5. compensating for the impact by replacing or providing substitute resources or environments to offset the loss

modeling: Use of mathematical equations to simulate and predict real events and processes.

monitoring: Measuring concentrations of substances in environmental media or in human or other biological tissues.

mortality: Death.

N, O

The National Register of Historic Places: A federally maintained register of districts, sites, buildings, structures, architecture, archeology, and culture.

Native American Sacred Site: A location on Federal land that an Indian Tribe or individual identifies as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion, provided that the Federal agency managing the land is informed of the existence of the site. Executive Order 13007 (May 24, 1996) provides for access to and protection of these sites.

No Action Alternative: The expected future condition if the proposed action is not taken—not necessarily the same as the present condition. The effects of the Action Alternatives are measured against the No Action Alternative.

obligate wetland species: A plant species that almost always grows in wetlands and deep water habitats.

operation and maintenance costs: The ongoing, repetitive costs of operating a water system; for example, employee wages and costs for treatment chemicals and periodic equipment repairs.

P, Q, R

predation: The consumption of one organism (the prey) by another (predator).

publics: Any interested group or individual, including Federal, State and local agencies, interest groups, ad hoc groups, and the general public.

public involvement: Process of obtaining citizen input into each stage of development of planning documents. Required as a major input into any EIS.

qualitative: Descriptive of kind, type, or direction, as opposed to size, magnitude, or degree.

quantitative: Descriptive of size, magnitude, or degree.

raptors: Birds of prey.

recruitment: Survival of young plants and animals from birth to a life stage less vulnerable to environmental change.

reservoir: Artificially impounded body of water; also, an extra supply of anything, as a reservoir of infection, etc.

riparian: Living on or adjacent to a water supply such as a riverbank, lake, or pond.

S

sand: Soil particles between 0.05 and 2.0 mm in diameter.

scenario: An outline of a natural or expected course of events. In this document, the alternatives can reach the various water elevations by different scenarios, depending upon the hydrology of a particular year.

scour: Removing debris and sediments from a channel by the force of water.

sediment: Unconsolidated solid material that comes from weathering of rock and is carried by, suspended in, or deposited by water or wind.

sedimentation: A water treatment process in which solid particles settle out of the water being treated in a large clarifier or sedimentation basin.

sensitive species: Species not yet officially listed but undergoing status review for listing on the U.S. Fish and Wildlife Service's official threatened and endangered list; species whose populations are small and widely dispersed or restricted to a few localities; and species whose numbers are declining so rapidly that official listing may be necessary.

silt: Soil particles between 0.05 and 0.002 millimeter in approximate diameter.

slope: Change in elevation per unit of horizontal distance.

species: Basic category of biological classification intended to designate a single kind of animal or plant.

snag: A standing dead tree.

special status species: For this EIS, those Fish and Wildlife Service Species of Concern that may occur within the study area.

stratification: Vertical grouping within a community. Arrangement in layers of a body of water, as a lake, into two or more horizontal layers with different characteristics.

substrate: Surface on which a plant or animal grows or is attached.

T

terrestrial: Living or growing on land.

threatened species: Any species that has the potential of becoming endangered in the near future. The ESA supports the recovery of threatened species by mandating conservation of the ecosystems upon which they depend.

traditional cultural property: A site or resource that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices or beliefs of a living community.

tributary: River or stream flowing into a larger river or stream.

U, V, W, X, Y, Z

upland: The higher ground of a region, in contrast to a valley or plain, or other low-lying land.

user day: The participation in a recreation activity at a given resource during a 24-hour period by one person.

velocity: Rate of flow of water or water-sediment mixture; expressed in feet per second or miles per hour.

visitor use: Visitor use of wilderness resource for inspiration, stimulation, solitude, relaxation, education, pleasure, or satisfaction.

warm water fishery: Generally, water or water system that has an environment suitable for species of fish other than salmonids.

watershed: The land that drains into a stream or a river.

water user: Any individual, district, association, government agency, or other entity that uses water supplied from a Reclamation project.

wetlands: Lands including swamps, marshes, bogs, and similar areas such as wet meadows, river overflows, mud flats, and natural ponds. Habitat provided by shallow or deep water (but less than 6-feet deep), with or without emergent and aquatic vegetation in wetlands.

Bibliography

Aggus, L.R. 1979. "Effects of weather on freshwater fish predator-prey dynamics." Pages 47-56 in R.H. Stroud and H. Clepper, eds. Predator-prey systems in fisheries management. Sport Fishing Institute, Washington, D.C.

________, and G.V. Elliott. 1975. "Effects of cover and food on year-class strength of largemouth bass." Pages 317-322 in H. Clepper, ed., Black Bass Biology and Management. Sport Fishing Institute, Wash. D.C.

Andelman, S.J. and A. Stock. 1994. Management, Research and Monitoring Priorities for the Conservation of Neotropical Migratory Landbirds that Breed in Washington State. Washington Natural Heritage Program. Washington Dept. of Natural Resources, Olympia, Washington.

Anderson, O. 1984. "Optimal foraging by largemouth bass in structured environments." Ecology: 65:851-861.

Beauchamp, D.A., B.C. Allen, R.C. Richards, W.A. Wurtzbaugh, and C.R. Goldman. 1992. "Lake trout spawning in Lake Tahoe: egg incubation in deepwater macrophyte beds." N. Amer. J. Fish. Manage. 12:442-449.

Benson, N.G. and B.C. Cowell. 1967. "The environment and plankton density in Missouri River reservoirs." Pages 358-373 in Reservoir Committee, eds. Reservoir Fishery Resources Symposium. Amer. Fish. Soc. Southern Div., Bethesda, Maryland.

Bentrup, G. and J. C. Hoag. 1998. The practical streambank bioengineering guide. User's guide for natural streambank stabilization techniques in the arid and semi-arid Great Basin and Intermountain West. Interagency Riparian/Wetland Plant Development Project, USDA—Natural Resources Conservation Service Plant Materials Center. Aberdeen, Idaho.

Betts, B.J. 1990. "Geographic distribution and habitat preferences of Washington ground squirrels (Spermophilus washingtoni)." Northwestern Naturalist. 71:27-37.

Bilby, Robert, et al. 2002. Review of Giorgi et al. Report, "Mainstem Passage Strategies in the Columbia River System: Transportation, Spill, and Flow Augmentation." Independent Scientific Advisory Board document 2002-1. www.nwcouncil.org/library/isab/isab2002-1.pdf.

Bonneville Power Administration. 2000. 2002 Final Power Rate Proposal Marginal Cost Analysis Study. Power Business Line. WP-02-FS-BPA-04 (May).

Bradley, C. and D. Smith. 1986. "Plains cottonwood recruitment and survival on a prairie meandering river floodplain, Milk River, southern Alberta and northern Montana." Canadian J. Botany 64:1433-1442.

Buehler, D.A. 2000. "Bald Eagle (Haliaeetus leucocephalus)." Birds of North America No. 506. The Birds of North America, Inc., Philadelphia, Pennsylvania. 40 pp.

Bureau of Economic Analysis

________a. Bearfacts Washington 1989-99. 2001. Accessed July 17, 2001. http://www.bea.doc.gov/bea/regional/bearfacts/bf10/53/b1053000.htm (May).

________b. Bearfacts Grant, Washington 1998-99. Accessed July 17, 2001. http://www.bea.doc.gov/bea/regional/bearfacts/bf10/53/b1053025.htm.

________c. Personal income by major source and earnings by industry—Grant County, Washington, 1999. 2001. Accessed July 25, 2001 http://www.bea.doc.gov/bea/regional/reis/action.cfm (updated June 25).

________d. Total full-time and part-time employment by industry—Grant County, Washington 1999. 2001. Accessed July 25, 2001. http://www.bea.doc.gov/bea/regional/reis/action.cfm (updated June 25).

Bureau of Labor Statistics. 2000. Labor force data by county, 2000 annual average. Grant County, Washington. Accessed August 14, 2001. ftp://146..142.4.23/pub/special.requests/la/laucounty.txt

Bureau of Reclamation. 2001. Banks Lake Resource Management Plan, Grant County, Washington. Upper Columbia Area Office, Ephrata, Washington (July).

________. 2001. Banks Lake Resource Management Plan Final Environmental Assessment, Grant County, Washington. Upper Columbia Area Office, Ephrata, Washington (March).

________. 2001. Scoping Summary, Banks Lake Drawdown Environmental Impact Statement, Columbia Basin Project, Washington. Pacific Northwest Region, Ephrata Field Office, Ephrata, Washington.

________. 2001. "Vegetation Observed within the Banks Lake Study Area." Appendix B. Banks Lake Resource Management Plan Final Environmental Assessment, Grant County, Washington. Upper Columbia Area Office, Ephrata, Washington (March).

Cadwell, L.L., M.A. Simmons, J.L. Downs, and C.M. Sveum. 1994. Sage grouse on the Yakima Training Center: A summary of studies conducted during 1991 and 1992. Pac. Northwest Lab., Richmond, Washington.

Campbell, G.L., A.A. Marfin, R.S. Lanciotti, and D.J. Gubler. 2002. West Nile virus. The Lancet Infectious Diseases 2:519-529.

Carmack, Corey P. 2001. "Nca?qawa"; a critical look at traditional cultural properties. Unpublished MS thesis, Central Washington University, Ellensburg.

CDC. 2001. Epidemic/epizootic West Nile virus in the United States: revised guidelines for surveillance, prevention and control. Available at URL: http:www.cdc.gov/ncidod/dvbid/westnile/publications.htm.

CDC. 2002. Provisional surveillance summary of the West Nile Virus epidemic---United States, January—November 2002. MMWR 2002;51:1129-1133.

Chelan County Public Utility District. Rock Island Hydro Project. Accessed May 22, 2002. http://www.chelanpud.org/hydro/ri/ROCKISLE.htm

________. Rocky Reach Hydro Project. Accessed May 22, 2002. http://www.chelanpud.org/hydro/rr/ROCKY.htm

Collee , D.E. and J.V. Shireman. 1980. "Coefficients of condition for largemouth bass, bluegill, and redear sunfish in hydrilla-infested lakes." Trans. Amer. Fish. Soc. 109:521-531.

Cook, Kirk. 1996. A Report on Nitrate Concentration of Ground Water in the Mid-Columbian Basin. Washington State Department of Ecology Report 96-017, 15 pages.

Connor, W.P., H.L. Burge, and D.H. Bennett. 1998. Detection of PIT-Tagged subyearling chinook salmon at a Snake River dam: Implications for summer flow augmentation. N. Amer. J. of Fish Mgmt. 18:530-536.

Connor, W.P., R.K Steinhorst, and H.L.Burge. 2000. Forecasting survival and passage of migratory juvenile salmonids. N. Amer. J. Fish. Mgmt. 20:650-659.

Connor, W.P., H.L. Burge, R. Waitt, and T.C. Bjornn. 2002. Juvenile life history of wild fall chinook salmon in the Snake and Clearwater Rivers. N. Amer. J. Fish. Mgmt. 22:703-712.

Connor, W.P., R.K. Steinhorst, and H.L. Burge. 2003a. Migrational behavior and seaward movement of wild subyearling fall chinook salmon in the Snake River. N. Amer. J. Fish. Mgmt.23:413-430.

Connor, W. P., H.L. Burge, J.R. Yearsley, and T.C. Bjornn. 2003b. The influence of flow and temperature on survival wild subyearling fall chinook salmon in the Snake River. N. Amer. J. Fish. Mgmt. 23:362-375.

Cooney, J.C. 1976. Impoundments. Mosquito News 36(4):413-414.

Corn, P.S. 1994. "What we know and don't know about amphibian declines in the West." Pp. 59-7 in Sustainable Ecological Systems: Implementing an Ecological Approach to Land Management. W.W. Covington and L.F. DeBano Tech. Coor., USDA Forest Service, Gen. Tech. Rept. RM-247, Ft. Collins, Colorado. 363 pp.

Council on Environmental Quality. 1997. Environmental Justice Guidance under the National Environmental Policy Act. http://ceq.eh.doe.gov/nepa/regs/ej/justice.pdf.

Crane, J.K. 2003. Here comes West Nile virus—again. The Clinical Advisor, July 2003:11-12.

Crowder, L.B. and W.E. Cooper. 1982. "Habitat structural complexity and the interaction between bluegill and their prey." Ecology 63:1802-1813.

Dibble, E.D. 1993. A patch dynamics study of habitat use by juvenile centrarchids in an Ozark reservoir. Doctoral dissertation. Univ. Arkansas, Fayetteville.

________, G.O. Dick and K.J. Killgore. 1996. "Measurement of plant architecture in seven aquatic plants." J. Freshwater Ecology 11:311-318.

Dionne, M., and C.L. Folt. 1991. "An experimental analysis of macrophyte growth forms as fish foraging habitat." Can. J. Fish. and Aquatic Sciences 48:123-131.

Douglas County Public Utility District. DCPUD—The Power Place. Accessed May 22, 2002. http://www.douglaspud.org/pud-web/powerplace.htm

Drucker, Phillip. 1948. Appraisal of Archaeological Resources of Equalizing, Long Lake and Potholes Reservoirs in East Central Washington. Report prepared by Columbia Basin Project, River Basin Surveys, Smithsonian Institution, Washington, D.C. On file, Upper Columbia Area Office, Bureau of Reclamation, Yakima.

Duff, R.L. 1973. 1971-72 Banks Lake Creek Census. Washington Department of Game, Region 2 (unpubl.).

Engle, S. 1985. Aquatic community interactions of submerged macrophytes. Wisconsin Dept. of Natural Resources Tech. Bulletin 156.

Engseth, Martin. 2003. Class III Archaeological, Historical and Traditional Cultural Properties Inventory of the Banks Lake. Fall 2002. Drawdown Zone, Douglas and Grant Counties, Washington. Report prepared by the History/Archaeology Department, Confederated Tribes of the Colville Reservation for the Upper Columbia Area Office, Bureau of Reclamation, Yakima, Washington.

Federal Register. 1999. Vol. 64, No. 206. pp 57620-57623.

________. 2001. Vol. 66, No. 231. pp 59734 59749.

Gartrell, F.E., W.W. Barnes, G.S. Christopher. 1972. Environmental impact and mosquito control water resource management projects. Mosquito News 32(3):337-343.

Giorgi, Albert, Mark Miller, and John Stevenson. 2002. Mainstem Passage Strategies In the Columbia River System: Transportation, Spill, and Flow Augmentation. Northwest Power Planning Council document 2002-3. www.nwcouncil.org/library/2002/2002-3.pdf.

Goddard, L.B., A.E. Roth, W.K. Reisen, and T.W. Scott. 2002. Vector competence of California mosquitoes for West Nile virus. Emerging Infectious Diseases 8(12):1385-1391.

Goldman, C.R., and A.J. Horne. 1983. Limnology. McGraw-Hill, Inc. New York.

Grant County Public Utility District. 2002. Who Are We? Accessed May 22, 2002.

Hamilton Stephen C. and Brent A. Hicks. 2000. Class III Archaeological and Historical Inventory of the Banks Lake Project Area. Draft report prepared by the History/Archaeology Department, Confederated Tribes of the Colville Reservation, for the Upper Columbia Area Office, Bureau of Reclamation, Yakima, Washington.

Hamilton Stephen C. and Brent A. Hicks. 2002. Class III Archaeological and Historical Inventory of the Banks Lake Project Area, Phase II. Draft report prepared by the History/Archaeology Department, Confederated Tribes of the Colville Reservation, for the Upper Columbia Area Office, Bureau of Reclamation, Yakima.

Harris, R. 1998. Personal communication, Jonathan M. Beck, of Dames and Moore, with Randy Harris, Geologist, USDI Bureau of Recreation, Grand Coulee Office. August 13, 1998.

Hassler, T.J. 1970. "Environmental influences on early development and year-class strength of northern pike in Lakes Oahe and Sharpe, South Dakota." Trans. Amer. Fish. Soc. 99:369-380.

Hays, D.W., M.J. Tirhi, M.J. and D.W. Stinson. 1998. Washington State status report for the sage grouse. Wash. Dept. Fish and Wildl., Olympia. 62 pp.

Hayse, J.W. and T.E. Wissing. 1996. "Effects of stem density of artificial vegetation on abundance and growth of age-0 bluegills and predation by largemouth bass." Transactions of the American Fisheries Society 125:422-433.

Hecky, R.E., and R.H. Hesslein. 1995. "Contributions of benthic algae to lake food webs as revealed by stable isotope analysis." J. N. Amer. Benthol. Soc. 14:631-653.

Hess, A.D. and C.C. Kiker. 1943. Water level management for malaria control on impounded waters. J. Natl. Malar. Soc. 3:181-196.

Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest an Illustrated Manual. University of Washington Press, Seattle, Washington.

Hoyer, M.V., B. Gu, and C. Schelske. 1997. "Sources of organic carbon in the food webs of two Florida lakes indicated by stable isotopes." In Jeppesen, E., M. Sondergaard, M. Sondergaard, K. Christoffersen, eds. The Role of Macrophytes in Structuring the Biological Community and Biogeochemical dynamics in Lakes. New York, Springer-Verlag.

_________, and D.E. Canfield, Jr. 1997. Aquatic Plant Management in Lakes and Reservoirs. Prepared by the North American Lake Management Society and the Aquatic Plant Management Society for the U.S. Environmental Protection Agency, Washington, D.C. Republished on the Internet November 1997.

Independent Scientific Advisory Board. 1997. Ecological impacts of the flow provisions of the Biological Opinion for endangered Snake River salmon on resident fishes in the Hungry Horse and Libby systems in Montana, Idaho and British Columbia. ISAB Fish Report. Northwest Power Planning Council, ISAB 97-3. Portland Oregon.

Irwin, E.R., and R.L. Noble. 1996. "Effects of reservoir drawdown on littoral habitat: assessment with onsite measures and geographic information systems." Pages 324-331 in L.E. Miranda and D.R. DeVries, eds. Multidemensional Approaches to Reservoir Fisheries Management. Amer. Fish. Society. Symposium 16, Bethesda, Maryland.

Jenkins, R.M. 1970. "Reservoir fish management." Pages 173-182 in N.G. Benson, editor. A century of fisheries in North America. Special publication 7, Amer. Fish, Soc., Bethesda, Maryland.

Johnson, R., C. McKinstry, C. Simmons, R. LeCaire, M. Simmons, C. Cook, S. Thorsten and S. Francis. 2003. *Chief Joseph Kokanee Enhancement Project, Strobe light deterrent efficacy test and fish behavior determination at Grand Coulee Dam third powerplant forebay*. Pacific North National Laboratory. Prepared for Bonneville Power Administration, Contract DE-AC06-6RL01830, January 2003.

Jones, J.R. and R.W. Bachmann. 1978. "Prediction of phosphorus and chlorophyll a in lakes." J. of Water Pollution Control Federation 48:2176-2181.

________. 1978. "Trophic status of Iowa lakes in relation to origin and glacial geology." Hydrobiologia 57:267-273.

Keast, A. 1984. "The introduced aquatic macrophyte, Myriophyullum spicatum, as habitat for fish and their invertebrate prey." Can. J. Zool. 62:1289-1303.

Knutzen, J.A. 1977. Operational Effects of Irrigation and Pumped Storage on the Limnology of Banks Lake, Washington. M.S. thesis, Univ. of Washington, Seattle. 120 pp.

Komar, N., S. Langevin, S. Hinten, N. Nemeth, E. Edwards, D. Hettler, B. Davis, R. Bowen, and M. Bunning. 2003. Experimental infection of North American birds with the New York 1999 strain of West Nile virus. Emerging Infectious Diseases 9(3):311-322.

Kulasekera, V.L., L Kramer, R.S. Nasci, F. Mostashari, B. Cherry, S.C. Trock, C. Glaser, and J.R. Miller. 2001. West Nile virus infection in mosquitoes, birds, horses, and humans, Staten Island, New York, 2000. Emerging Infectious Diseases 7(4):

LeCaire, Richard. 1999. "Chief Joseph kokanee enhancement project." Draft 1999 annual report and final report on entrainment. Confederated Tribes of the Colville Indian Reservation, BPA Project No. 9501100.

Lillie, R.A., and J. Budd. 1992. "Habitat architecture of Myriophyllum spicatum L. as an index to habitat quality for fish and macroinvertebrates." J. Freshwater Ecol. 4:113-121.

Madder, D.J., G.A. Surgeoner, and B.V. Helson. 1983. Number of generations, egg production, and developmental time of *Culex pipiens* and *Culex restuans* (Diptera:Culicidae) in southern Ontario. J. Med. Entomol. 20(3):275-287.

Mahoney, J.M. and S.B. Rood. 1991. "A device for studying the influence of declining water table on poplar growth and survival." Tree Physiol. 8:305-314.

Miller, A.C., D.C. Beckett, C.M. Way and E.J. Bacon. 1989. The habitat value of aquatic macrophytes for macroinvertebrates. Tech. Rept. A-89-3, U.S. Army Corps of Engineers, Washington, D.C. 66 pp.

Minnesota IMPLAN Group, Inc.

________a. 2000. IMPLAN Professional TM Version 2.0 Social Accounting and Impact Analysis Software. 2nd Edition, Stillwater, Minnesota (June).

________ b. IMPLAN Professional 2.0 (software) Stillwater, Minnesota, Copyright 1999 MIG, Inc. Data for Grant County, Washington.

________ c. 1998 IMPLAN Data—Grant County, Washington. Affected Area (software) Stillwater, Minnesota, Copyright 1999 MIG, Inc.

National Marine Fisheries Service. 1999. Biological Opinion, Washington Conservation Reserve Enhancement Program. NMFS Log # WSB-99-462, USFWS Log # 1-3-F-0064.

National Marine Fisheries Service. 2000. Biological Opinion—Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin,

http://www.nwr.noaa.gov/1hydrop/hydroweb/docs/Final/2000Biop.html

Natural Resource Conservation Service. 2000. Riparian/Wetland Project Information Series No. 16. Riparian Planting Zones in the Intermountain West. http://plant-materials.nrcs.usda.gov/pubs/idpmcarwproj16.pdf

Nichols, S.A. and J.G. Vennie. 1991. Attributes of Wisconsin lake plants. Inf. Cir. 73. Wis. Geol. Nat. Hist. Survey., Madison. 19 pp.

Northwest Fisheries Science Center. 2000. Salmonid Travel Time and Reservoir Survival Related to Flow in the Columbia River.

Pardue, G.B. 1973. "Production response of the bluegill sunfish Lepomis machrochirus to added attachment surface for fish-food organisms." Trans. Amer. Fish. Soc. 102:622-626.

Pelikan, J., J. Svoboda, and J. Kvet. 1971. "Relationship between the population of muskrats (Ondatra zibethica) and the primary production of cattail (Typha latifolia)." Hydrobiologia 12:177-180.

Perry, R., M. Farley, T. Darland, G. Hansen, D. Feil, D. Rondorf and R. LeCaire. 2003. *Feasibility of using 3D acoustic telemetry to assess the response of resident salmonids to strobe lights in Lake Roosevelt, Washington*. Pacific North National

Laboratory. Annual Report for 2001. Prepared for Bonneville Power Administration, Project. No. 1995-011-02.

Pflieger, W.L. 1997. The Fishes of Missouri. Missouri Department of Conservation, Jefferson City, MO.

Ploskey, G.R. 1986. "Effects of water-level changes on reservoir ecosystems with implications for fisheries management." Pages 86-97 in G.E. Hall and M.J. Van Den Avyle, eds. Reservoir Fisheries Management: Strategies for the 80's. Reservoir Committee, Amer. Fish. Soc., Bethesda, Maryland.

Pratt, H.D. and C.G. Moore. 1993. Mosquitoes of Public Health Importance and their Control. Self-Study Course 3013-G, Vector-Borne Disease Control. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Reclamation. See Bureau of Reclamation.

Savino, J.F. and R.A. Stein. 1989. "Behavioral interactions between fish predators and their prey: Effects of plant density." Animal Behavior 37:311-321.

Schmierer, J. 2000. Purdue Forage Information: Reed Canarygrass. Purdue University Agronomy Extension. Online at http://www.agry.purdue.edu/ext/forages/publications/grasses/reed_canry.htm

Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. Bulletin 184. Fisheries Research Board of Canada, Ottawa.

Service. See U.S. Fish and Wildlife Service.

Simpson, J. and R. Wallace. 1982. Fishes of Idaho. University Press of Idaho. Moscow, Idaho.

Smart, R.M. and G.O. Dick. 1999. Propagation and establishment of aquatic plants: A handbook for ecosystem restoration projects. APCRP Technical Notes Collection (Tec. Report A-99-4). US. Army Corps of Engineers Waterways Experiment Station. Vicksburg, MS. 26 pp.

Smith, L.M. and J.A. Kadlec. 1985. "Fire and herbivory in a Great Salt Lake marsh." Ecology 66:259-265.

Snow, W.E. 1956. Production and control of floodwater mosquitoes incidental to water level operations on reservoirs of the Tennessee Valley Authority. Proceedings Tenth International Congress of Entomology 3:745-750.

Sojda, R.S. 1993. Management and Control of Cattails. *In* Waterfowl Management Handbook. U.S. Fish and Wildlife Service, Fort Collins, Colorado, online at: http://www.nwrc.usgs.gov/wdb/pub/wmh/13_4_13.pdf

Stalmaster, M.V. 1987. The Bald Eagle. Universe Books. New York. 227 pp.

Steinkampf, W.C. 1989. Water-quality characteristics of the Columbia Plateau regional aquifer system in parts of Washington, Oregon, and Idaho. U.S. Geological Survey, Water-Resources Investigations Report 87-4242, 37 p.

Steinmetz, Gordon. 1998. Personal communication.

Stevens, Rebecca A. 1999. An Archaeological and Historical Overview of the Upper Grand Coulee, Douglas and Grant Counties, Washington. Eastern Washington University Reports in Archaeology and History 100-101, Cheney.

Stinson, D.W., J.W. Watson, and K.R. McAllister. 2001. Washington State status report for the bald eagle. Wash. Dept. Fish and Wildlife. Olympia. 92 pp.

Stober, Q.J., R.W. Tyler, G.L. Thomas, L. Jensen, J.A. Knutzen, D.L. Smith and R.E. Nakatani. 1976. Operation Effects of Irrigation and Pumped Storage on the Ecology of Banks Lake Washington. Third Ann. Prog. Rep., June 1, 1976. FRI-UW-7610, August 1976. Univ. of Washington. 313 pp.

Stromberg, J. 1994. Riparian Protection Program, Legislative Report. Vol. B. Arizona Dept. Water Resources, Phoenix, Arizona.

Stromberg, J. 1992. "Instream flow models for mixed deciduous riparian vegetation within a semiarid region." Cited in McKee, J.P., G. Patton, K. Willie and J. Carlson. The Animas-La Plata Project: Assessment of project impacts to riparian corridor vegetation communities. Tech. Memo. No. 8260-95-10. Sept. 1995.

Sveum, C.M., W.D. Edge, and J.A. Crawford. 1998. "Nesting habitat selection by sage grouse in south-central Washington." J. Range Manage. 51:265-269.

Tadzhieva, V.S., Z.M. Khaidarova, S.A. Zainiev, Z.A. Galina, V.V. Atarskaya, and M.S. Muminov. 1979. Formation of a focus of mass mosquito breeding in Arnasaisk lowering of the Uzbek SSR. Communication I. Med. Parasitol. Parasit. Bolezn. 48(2):46-50. (in Russian with English abstract).

Thomas, G.L. 1978. The Comparative Responses of Kokanee, Lake Whitefish and Yellow Perch to Hydrological Perturbations in Banks Lake, Grant County, Eastern Washington. PhD Dissertation, Univ. of Washington, Seattle. 160 pp.

Turner, F.B. 1960. "Population structure and dynamics of the western spotted frog, Rana p. pretiosa Baird and Girard, in Yellowstone National Park, Wyoming." Ecol. Monogr. 30(3):251-278.

U.S. Census Bureau. 1990 and 2000. Census.

________ a. American Fact Finder. DP-1. Profile of General Demographic Characteristics: 2000. Coulee City town, Washington. Accessed July 19, 2001. http://factfinder.census.gov/servlet/QTTa…15080&qr_name=DEC_2000_SF1_U_DP1&_lang=en

________ b. American Fact Finder. DP-1. Profile of General Demographic Characteristics: 2000. Electric City town, Washington. Accessed July 19, 2001. http://factfinder.census.gov/servlet/QTTa…21030&qr_name=DEC_2000_SF1_U_DP1&_lang=en

________ c. American Fact Finder. DP-1. Profile of General Demographic Characteristics: 2000. Ephrata city, Washington. Accessed July 19, 2001. http://factfinder.census.gov/servlet/QTTa…22080&qr_name=DEC_2000_SF1_U_DP1&_lang=en

________ d. American Fact Finder. DP-1. Profile of General Demographic Characteristics: 2000. Moses Lake city, Washington. Accessed July 19, 2001. http://factfinder.census.gov/servlet/QTTa…47245&qr_name=DEC_2000_SF1_U_DP1&_lang=en

________ e. Model-Based Income and Poverty Estimates for Grant County, Washington in 1997. Revised November 28, 2000. Accessed July 19, 2001 http://www.census.gov/hhes/www/saipe/estimate/cty/cty53025.htm

________ f. Model-Based Income and Poverty Estimates for Washington in 1997. Revised November 28, 2000. Accessed July 19, 2001 http://www.census.gov/hhes/www/saipe/estimate/cty/cty53000.htm

________ g. State and County Quick Facts, Grant County, Washington. Revised July 3, 2001. Accessed July 17, 2001. http://quickfacts.census.gov/qfd/states/53/53025.html

________ h. State and County Quick Facts, Washington. Revised July 3, 2001. Accessed July 17, 2001. http://quickfacts.census.gov/qfd/states/53000.html

________ i. USA Counties 1998. Grant, Washington, General Profile. Accessed July 19, 2001. http://www.census.gov/statab/USA98/53/025.txt

U.S. Department of Agriculture 1984. *Soil Survey of Grant County, Washington. United States Department of Agriculture, Soil Conservation Service in Cooperation with Washington State University*, Agricultural Research Center. January 1984.

U.S. Department of Agriculture 1981. *Soil Survey of Douglas County, Washington. United States Department of Agriculture, Soil Conservation Service in Cooperation with Washington State University*, Agricultural Research Center. November 1981.

U.S. Forest Service. 2000. Forest Service plant database. www.fs.fed.us/database/feis/plants.html.

________. 2000. Umatilla National Forest native plant species database. www.fs.fed.us/r6/uma/native/ts38.htm.

U.S. Fish and Wildlife Service. 1998. Planning Aid Memorandum for the Banks Lake Resource Management Plan. Moses Lake and Spokane, Washington. 56 pp.

________. 1999. Planning Aid Memorandum for the Banks Lake Resource Management Plan. Moses Lake and Spokane, Washington 8 pp.

________. 2000. Final Fish and Wildlife Coordination Act Report for the Bureau of Reclamation's Banks Lake Resource Management Plan. Upper Columbia River Basin Sub-Office, Ephrata, Washington.

________. 2002. Banks Lake 10-foot Drawdown Draft Coordination Act Report (CAR). FWS Reference: 01-sp-E0335 (January 17).

Walburg, C.H. 1976. Changes in the fish population of Lewis and Clark Lake, 1956-74, and their relation to water management and the environment. Research Report 79, U.S. Fish and Wildlife Service, Washington, D.C.

Washington Cooperative Fish and Wildlife Research Unit. 2001. http://www.fish.washington.edu/naturemapping/wagap/public_html/

Washington Dept. Fish and Wildlife. 1995. Washington State Recovery Plan for the Pygmy Rabbit. Olympia, Washington. 50 pp.

Washington State Department of Health. 2002. Washington State Mosquito-borne Disease Response Plan. Available in electronic format on the Internet at: www.doh.wa.gov/ehp/ts/zoo/wnv/wnv.html.

Washington Dept. Natural Resources. 2001. http://www.wa.gov/dnr/htdocs/fr/nhp/refdesk/fguide/htm/4phletxt.htm

Western Region Climate Center, 2002. Climate of Washington available online at: http://www.wrcc.dri.edu/narratives/WASHINGTON.htm

WHO. 2000. Human health and dams. WHO/SDE/WSH/00.01.

Williams, D.D., A. Tavares-Cromar, D.J. Kushner, and J.R. Coleman. 1993. Colonization patterns and life-history dynamics of *Culex* mosquitoes in artificial ponds of different character. Can. J. Zool. 71:568-578.

Willis, M.J., G.P. Keister, D.A. Immell, D.M. Jones, R.M. Powell and K.R. Durbin. 1993. Sage grouse in Oregon. Oreg. Dept. Fish and Wildl., Wildl. Res. Sect., Wildl. Res. Rep. 15.

Wydoski, R.S. and R.R. Whitney. 1979. Inland Fishes of Washington. University of Washington Press. Seattle, Washington.

Index

A

Acres irrigated in the CBP 4
Action Alternative 14
Affected Environment 23
Air quality 73, 121
Alternatives considered but eliminated 18
Alternatives considered in detail 12
Alternatives development process 9
American bulrush 18
Amphibians and reptiles 93
Anadromous fish 125
Aquatic food base 35, 85
Aquatic macrophytes 23, 26, 124
Archeological Resources Protection Act 63

B

Bald eagle 40, 96
Baltic rush 18
Banks Lake elevation under alternatives 17
Banks Lake operations 3
Banks Lake Resource Management Plan 23
Benthic invertebrates 18, 36, 88
Bibliography 161
Black Tern 46, 97
Boat launch sites 53, 54
Boulders, cobble, and gravel 34

C

California Floater....48, 98
Carp....88
Castle Rock Natural Area Preserve Management Plan....7
Cattails....18
Chelan Rockmat....49, 98
Colonial nesting birds....93
Columbia Basin Wildlife Area Management Plan....7
Columbia sharp-tailed grouse....46, 97
Columbia spotted frog....48, 98
Colville Confederated Tribes....66
Consultation and Coordination....129
Crops grown....62
Cultural resources survey....64
Cumulative impacts....124

D

Day use activities....52
Decisions to be made....2
Distribution list....141
Douglas County Comprehensive Plan....7
Drawdown....13, 16

E

Early draft scenario....13
Economics....54, 102
Emergent macrophytes....25
Employment and income data....60
Endangered Species Act....134
Environmental Assessment—Banks Lake Resources Management Plan....6
Environmental Consequences....77
Environmental justice....67, 116

F

FCRPS Impacts....103
FDR Lake biota....78
Federal Columbia River System Operations Biological Opinion....6
Fish....29, 84
Fish and wildlife....125
Fish and Wildlife Coordination Act....135
Fish Nets at Dry Falls Dam....36
Franklin D. Roosevelt (FDR) Lake....3

Fringed Myotis 43, 97
Full pool water surface elevation 9

G

GCPHA power generation 106
General description of the area 3
Glossary 151
Grand Coulee power complex 54
Grand Coulee pump-generating plant 3
Grande Ronde aquifer 70
Grant County Comprehensive Plan 6
Grant County Shorelines Management Master Program 7
Grant County, rural area 59
Groundwater Management Area 7
Groundwater Quality 69, 121
Growth forms
  emergent 25
  floating-leaved 25
  submersed 25

H, I

Hiking 52
Historic resources 63, 113
Historic sites 65
Hunting 52
Hydropower Generation Impacts 102
Hydropower resources 54, 102
Implan, regional model 60
Indian Trust Assets 66
Irreversible and irretrievable commitments of resources 127
Irrigated agriculture 63, 113
Issues identified 2, 130

J, K, L

Juvenile channel catfish 87
Juvenile largemouth bass 87
Juvenile mountain whitefish 88
Juvenile walleye 87
Land-based recreation 51
Largemouth bass 18
Late draft scenario 13
Left and right powerplants 55
List of preparers 149

Littoral zone 23, 80
Loggerhead shrike 46, 98
Long-eared myotis 44, 97
Low head powerplant on the Main Canal 57
Low water scenario 13

M, N

Macrophyte plant species 79
Mammals 93
McEntee's Crossing 64
Mosquito-borne disease 75
Mosquitoes 74, 123
Multicomponent properties 65
National Historic Preservation Act 64, 138
Native American Sacred Sites 65, 115
Natural drainage basin 4
Nature study 52
Neotropical Migrant Songbirds 92
No Action Alternative 13
Northern pikeminnow 18
Northern sagebrush lizard 48, 98
Northrup Canyon 52

O, P

Olive-sided Flycatcher 47, 98
Pale townsend's big-eared bat 44
Per capita personal income 59
Period of the analysis 2
Permits required for implementation 3
Preferred alternative 13
Prehistoric sites 64
Previous historic Investigations 63
Prickly sculpin 18, 88
Priest Rapids Development 58
Public health 73, 122
Public hearings 132
Public involvement 129
Public scoping meeting 130
Public Utility District Powerplants 57, 107
Pump-generating plant 55
Pumpkinseed 18
Purpose and need 1
Pygmy rabbit 40, 95

R

Range of average flows at McNary Dam for August 11
Raptors 92
Recreation 50, 100, 125
Recreation days 110
Recreation expenditures 112
Recreation net benefits 112
Recreation visits 101, 112
Reed canarygrass 18
Refill 14, 16
Regional/local economy 59, 109
Relationship between short-term uses and long-term productivity 126
Reregulating reservoir 3
Resident fish 79
Review of draft EIS 132
Riparian vegetation 24, 28, 79, 124
Rock Island Project. 58
Rocky Reach Project. 58

S

Salishan Mesa 64
Scenic quality 71
Scope 2
Scoping process 2, 129
Sedges 18
Setting 4
Shallow aquatic macrophytes 18
Shallow Unvegetated Flats 33, 86
Shorelines erode 73
Small-footed myotis 45, 97
Smallmouth bass 18
Snake River fall chinook salmon 39, 95
Social environment 73, 122
Softstem bulrush 18
Soils 68, 73, 121
Spawning and nursery habitat 30, 85
Species of concern 43
Spokane Resource Management Plan 7
Steamboat Rock Bald Eagle Nest Territory Management Plan 6
Steamboat Rock State Park 51
Steamboat Rock State Park Recreation Area 5
Sticky phacelia 49, 98

Suckers 88
bridgelip 18
largescale 18
longnose 18
Summary comparison of the environmental consequences 19
Summary of impacts
Aquatic macrophyte 83
Fish 89
Riparian species 84
Species of concern 99
Wildlife 94
Sunbanks Resort 51
Surface water quality 68, 117
Susceptibility of juvenile fish to predation 34

T, U, V

Third Powerplant 55
Threatened and endangered species 38, 95
Total population and minority data for Grant County 67
Traditional cultural properties 65, 115
Tribal consultation 138
Unavoidable adverse impacts 126
Uniform draft scenario 13
Ute ladies'-tresses 41, 96
Vegetation 24, 79
Visual quality 71, 121

W

Walleye 18
Wanapum Development. 58
Wanapum unit aquifer 69
Washington ground squirrel 43, 97
Water supply for the reservoir 3
Water-based recreation 52
Waterfowl 93
Wells Hydroelectric Project. 57
West Nile Virus 75, 123
Western burrowing owl 47, 98
Western sage grouse 42, 97
Wildlife 36, 92
Wildlife watching 52

X, Y, Z

Yellow bullhead 18
Yellow perch 18
Yuma Myotis 45, 97
Zooplankton 35, 88

Appendix A

Fish and Wildlife Consultation and Coordination

EPH-2003
ENV-4.00

MEMORANDUM

To: Fish and Wildlife Service, PO Box 848, Ephrata WA 98823
Attention: Mark Miller, Field Supervisor

From: William D. Gray
Deputy Area Manager

Subject: Species List Request - Banks Lake Drawdown Study, 2000 FCRPS Biological Opinion, RPA Action 31

Reclamation is requesting a list of threatened and endangered species, candidate species and species of concern as required by the Endangered Species Act to be incorporated into the study for the proposed additional 5-foot drawdown of the reservoir in August.

This project is located at Banks Lake in Grant County, Washington, north of Coulee City, Washington, and south of Grand Coulee, Washington.

Reclamation is in the process of preparing an Environmental Impact Statement (EIS) under the National Environmental Policy Act. The draft EIS will evaluate impacts of lowering the surface elevation of the reservoir from 1565 feet to 1560 feet during the month of August each year.

Should you have any questions regarding this request, please contact Jim Blanchard at (509) 754-0226.

Attachment

bc: Regional Director, Boise ID
Attention: PN-6519

Upper Columbia Area Office, Yakima WA
Attention: UCA-1600

EPH-2000, -2003, -2704-3

JBlanchard:ln:5-7-01

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
P. O. Box 848
Ephrata, Washington 98823
Phone: 509-754-8580 Fax: 509-754-8575

May 30, 2001

William D. Gray
Bureau of Reclamation
Ephrata Field Office
P.O. Box 815
Ephrata, Washington 98823

RE: Species List Request
FWS Reference: 01-SP-E0335

Dear Mr. Gray:

We have received your request for information on endangered and threatened species and their habitats that may be present near Banks Lake located in Grant and Douglas Counties, Washington. The following threatened and endangered species, and candidate species may be present within the project area: **Endangered;** none **Threatened;** Bald eagle *(Haliaeetus leucocephalus)* and Ute ladies'-tresses *(Spiranthes diluvialis)* **Candidate;** Washington ground squirrel *(Spermophilus washingtoni)* and Western sage grouse (*Centrocercus urophasianus*)

Should the Biological Assessments (BA) for the proposed projects indicate that a listed species is likely to be affected (adversely or beneficially) by the project, the federal agency or its designated representative should request section 7 consultation through this office. If the BA indicates that the proposed action is "not likely to adversely affect" a listed species, the federal agency or its designated representative should request Service concurrence with that determination through the informal consultation process. If the BA indicates the project to have "no effect," we would appreciate receiving a copy for our information.

There are other species, including anadromous fishes that have been federally listed by the National Marine Fisheries Service (NMFS). Some of these species may occur in the vicinity of your project. Please contact NMFS in Lacey, WA at (360) 481-5742 to request a species list.

Thank you for your efforts to protect our nation's species and their habitats. If you have additional questions regarding responsibilities under the Act, please contact Gregg Kurz of this office at (509) 754-8580.

Sincerely,

Mark G. Miller

Supervisor

UCA-1600
ENV-1.10

Mr. Mark Miller, Supervisor
U.S. Fish and Wildlife Service
Eastern Washington Ecological Services Office
215 Melody Lane, Suite 119
Wenatchee, WA 98801-5933

Subject: Request for Concurrence - Section 7 of the Endangered Species Act (Act) – Environmental Impact Statement for Potential Drawdown of Banks Lake – Columbia Basin Project

Dear Mr. Miller:

Enclosed please find a copy of the draft Environmental Impact Statement (DEIS) for the Banks Lake Drawdown. In accordance with the requirements of Section 7 of the Act, Reclamation is providing you this DEIS which will serve as the Biological Assessment for the potential action.

Please review this document with our determination of "may affect, but not likely to adversely affect" for the bald eagle. If you agree with our determination, please provide us with written concurrence for inclusion with the final document.

If you should have any questions please contact Mr. Jim Blanchard at 509-754-0226.

Sincerely,

J. Eric Glover
Area Manager

Enclosure

bc: UCA-1000, UCA-1600, EPH-2000, EPH-2003 (2)
(ea. w/o encl)

WBR:DKaumheimer:kt:12/20/02:509-575-5848 Ext. 232
g:/msword/kt/correspondence/Kaumheimer/BL Sec 7 USFWS Request.doc

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Central Washington Field Office
215 Melody Lane, Suite 119
Wenatchee, Washington 98801
Phone: (509) 665-3508 Fax: (509) 665-3509

April 3, 2003

J. Eric Glover
Area Manager
Bureau of Reclamation
Upper Columbia Area Office
1917 Marsh Road
Yakima, Washington 98901-2058

RE: Request for Concurrence - Section 7 of the Endangered Species Act
Environmental Impact Statement for Potential Drawdown of Banks Lake
Columbia Basin Project
FWS Reference: 01-SP-E0335

Dear Mr. Glover:

Thank you for your letter of January 6, 2003, which included the Draft Environmental Impact Statement (DEIS) for the proposed Banks Lake Drawdown. The DEIS examines the impacts of alternatives to lower the minimum surface elevation for Banks Lake in August from 1565 feet to 1560 feet.

The Bureau of Reclamation (BOR) has determined that the proposed project may affect, but is not likely to adversely affect bald eagle (*Haliaeetus leucocephalus*). The U. S. Fish and Wildlife (Service) concurs with the BOR determination that the proposed project may affect, but is not likely to adversely affect bald eagle.

This concludes informal consultation for species under the purview of the Service pursuant to Section 7 of the Endangered Species Act of 1973, as amended (Act). This project should be reanalyzed if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this project.

Your efforts to protect endangered species are appreciated. If you have further questions about this letter or your responsibilities under the Act, please contact me or Steve Lewis of my staff at (509)665-3508, ext: 14.

Sincerely,

Mark G. Miller

Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Central Washington Field Office
215 Melody Lane, Suite 119
Wenatchee, Washington 98801
Phone: (509) 665-3508 Fax: (509) 665-3509

April 25, 2003

To: Bill Gray, Project Manager, Ephrata Field Office,
Bureau of Reclamation, Ephrata, Washington

From: Mark G. Miller, Project Leader, Central Washington Field Office
U.S. Fish and Wildlife Service, Wenatchee, Washington /S/ Mark G. Miller

Subject: Banks Lake 10-Foot Drawdown Final Coordination Act Report (CAR)
FWS Reference: 01-SP-E0335

Attached is the U.S. Fish and Wildlife Service=s (Service) Final Coordination Act Report (CAR) for the Bureau of Reclamation=s (BOR) Banks Lake 10-foot drawdown. The Service requests your concurrence on this report. This CAR was prepared pursuant to the Fiscal Year 2001 Scope-of-Work and Interagency Agreement between the Service and the BOR. This CAR is provided under the authority of and in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. 661 et seq).

The BOR has proposed this 10-foot drawdown as part of a strategy to augment flows in the Columbia River for the spring and summer juvenile outmigration of threatened and endangered salmonid stocks in addition to meeting target flows at McNary Dam. Information in this CAR was provided in part through the Service=s Planning Aid Memorandum (PAM) for the Bank=s Lake Resource Management Plan (RMP). The study design in this PAM was specifically designed to help characterize vegetation within the study area, evaluate habitat types to be included in a Geographical Information System (GIS) database for the study area, identify important wildlife resources and unique or sensitive habitats, assess existing resource impacts, determine ways to avoid adverse impacts to wildlife resources and habitats, and make recommendations for future management actions. Analysis in this report is based on a series of habitat and wildlife surveys; aerial photos, maps and other information provided by the BOR; observations and prior knowledge of the Service and Washington Department of Fish and Wildlife (WDFW) personnel; literature; resource information readily available from our files; and conversations with the BOR, WDFW, Washington State Park and Recreation, and Bureau of Land Management personnel.

We appreciate the opportunity to provide the attached Final CAR. Comments regarding this document should be filed with the Service no later than two weeks from the issuance of this document and addressed to Steve Lewis of my staff.

ATTACHMENTS

CC: USFWS, Spokane, (Susan Martin)
WDFW, Olympia, (Shane Scott)
WDFW, Ephrata, (Jeff Korth)
NMFS, Ellensburg, (Dale Bambrick)
BOR, Ephrata, (Jim Blanchard)

FINAL
FISH AND WILDLIFE COORDINATION ACT REPORT
FOR THE
U.S. BUREAU OF RECLAMATION'S
BANKS LAKE 10-FOOT DRAWDOWN STUDY

PREPARED BY

U.S. FISH AND WILDLIFE SERVICE
CENTRAL WASHINGTON FIELD OFFICE
WENATCHEE, WASHINGTON

PREPARED FOR

U. S. BUREAU OF RECLAMATION
COLUMBIA IRRIGATION PROJECT
EPHRATA, WASHINGTON

April 2003

Executive Summary

The Bureau of Reclamation (BOR) of Grant County operates Banks Lake as a re-regulation reservoir for the Columbia Basin Project (CBP). The reservoir is approximately 27 miles long and contains slightly more than one million acre feet of water at full pool. The water supply for the reservoir is stored behind Grand Coulee Dam and is lifted from Franklin Delano Roosevelt Reservoir into Banks Lake. Water is delivered into the Main Canal at Dry Falls Dam on the southern end of Banks Lake and from there delivered to approximately 670,000 acres. This is just over one-half of the authorized lands for the CBP. The BOR currently operates the reservoir in the top five feet of the pool between elevations 1565 feet and 1570 feet.

Action 31 of the Federal Columbia River Power System (FCRPS) Biological Opinion (BO) issued by the National Marine Fisheries Service (NMFS) on December 21, 2000 calls for the assessment of operation of Banks Lake at up to 10 feet below full pool beginning in August of each year to enhance flows in the Columbia River during the juvenile outmigration of salmonid stocks listed under the Endangered Species Act (ESA). An annual lowering in August to elevation 1560 (10 feet below full pool) would constitute a change in how Banks Lake has been operated over the last 20 years. After August 31, refill would continue as currently allowed under existing authority.

The purpose of this project is to enhance the probability of meeting target flows in the Columbia River at McNary Dam during the juvenile outmigration of ESA listed salmonid stocks by altering the August drawdown of Banks Lake from elevation 1565 feet down to elevation 1560 feet, in compliance with Action No. 31 of the Reasonable and Prudent Alternative of the Federal Columbia River Power System Biological Opinion, issued by the National Marine Fisheries Service on December 21, 2000.

A Notice of Intent to prepare an Environmental Impact Statement (EIS) on altering existing operations at Banks Lake (i.e an annual drawdown of up to 10 feet from full pool) and an announcement of public scoping meetings appeared in the Federal Register on April 25, 2001. A meeting notice describing the project, requesting comments, providing a return postage paid envelope, and announcing the date, time, and location of the public scoping meeting was mailed to over 300 potentially interested individuals, groups, and governmental agencies. A press release announcing the public meetings was issued to area media.

The Banks Lake study area exhibits a wide range of fish and wildlife species and associated habitat zones. These include the presence of various raptor species which utilize the adjacent cliff habitat to cold-water and warm-water fish species which inhabit distinct areas in the water column of Banks Lake. The U.S. Fish and Wildlife Service (Service) has developed a series of recommendations in the following draft Fish and Wildlife Coordination Act Report (CAR) which attempt to preserve these unique fish and wildlife species and accompanying habitats while at the same time providing and examining the optimum scenario under which flow augmentation will be used to enhance populations of threatened and endangered salmonid stocks in the Columbia.

Introduction

Banks Lake is a re-regulation reservoir for the Columbia Basin Project (CBP) which is located in the upper Grand Coulee in central Washington State. Banks receives its water supply from Grand Coulee Dam which is located on the Columbia River approximately 380 feet below the elevation of the Lake. Banks Lake was developed by the Bureau of Reclamation (BOR) primarily to receive and store water from the Columbia River via pumps at Grand Coulee Dam. These pumps have the capability of supplying up to 20,000 cubic feet per second (cfs) of water. It then provides the irrigation water supply for the Columbia Basin Irrigation Project through a system of canals and laterals starting at the southern end of Banks Lake at the Main Canal.

Banks Lake holds over one million acre/feet (ac./ft.) of water, but supplies over 2.4 million ac./ft. to the Project each year. Therefore, the reservoir is replenished about two and a half times during the irrigation season. The lands around the reservoir are managed by a group of agencies with the major portion of the land being managed by the State of Washington through the Washington Department of Fish and Wildlife (WDFW) and the Washington State Parks Commission (Parks). Other management entities include Coulee City, Electric City, Town of Grand Coulee and a half section of land owned by the Department of Natural Resources (Sunbanks Resort). By state law the water surface is managed by the Grant County Sheriff.

The BOR must manage Banks Lake to meet irrigation commitments, assure public safety, and protect property. Aside from those constraints, the BOR has considerable flexibility in managing for a variety of other important resources, such as fish and wildlife and their habitats, cultural resources, recreational activities, education, etc. Currently, the BOR has transferred recreation and fish and wildlife management responsibilities at Banks Lake to the Washington Department of Fish and Wildlife (WDFW) and Washington State Parks and Recreation Commission (WSPRC) under a 1953 memorandum of agreement. The BOR is proposing a 10-foot drawdown from the normal peak elevation of Banks Lake (1570 feet to 1560 feet) with the expressed goal of increasing Columbia River flow and assisting the outmigration of juvenile salmonids. The first five feet of water would most likely be taken from Banks Lake during July 2002 followed by the remaining five feet in August 2002. Approximate acreage exposed during 10-foot drawdown would be 3,000 acres per five feet of drawdown or 6,000 acres total.

BOR recently completed a public process to develop a Resource Management Plan for Banks Lake (Banks Lake Resource Management Plan, March 2001) which included participation from all managing partners. As part of the process, BOR also entered into an agreement with USFWS to develop guidance on fish and wildlife resources at the reservoir. Recommendations received from the USFWS were used in conjunction with advice received from WDFW to develop the RMP. A Fish and Wildlife Coordination Act Report (CAR) was completed during the RMP process. Much of the information supplied by the two agencies was incorporated into an Environmental Assessment. In addition, BOR had requested and received a species list from the Service for the drawdown study.

WDFW has had a representative at the public scoping meeting, but the BOR had not received specific information from that agency as to any concerns they may have regarding this project. It is anticipated that some information, in addition to that received for the RMP, may be available from WDFW and will be solicited by BOR. In particular, we hope WDFW will provide more specific information on possible impacts to the fishery in the reservoir.

This Fish and Wildlife Coordination Act Report (CAR) is provided to the BOR to assist with the with the evaluation of the 10-foot drawdown of Banks Lake. It has been prepared by the U.S. Fish and Wildlife Service (Service) under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This final CAR constitutes the report of the Service and the Department of the Interior (DOI) pursuant to section 2 (b) of the FWCA, on the proposed Banks Lake RMP.

Study Area

The study area for this proposed action included Banks Lake and the BOR lands surrounding Banks Lake. Initially, the BOR also included Northrup Canyon in the study area, because of its ecological connectivity with Banks Lake, although it is administered by WSPRC and Bureau of Land Management. They also funded the Service to conduct some studies in Northrup Canyon related to the issuance of the Banks Lake RMP. Northrup Canyon provides important and unique habitat for a diverse complement of wildlife species. Unfortunately, the RMP does not discuss how actions at Banks Lake may impact resources of Northrup Canyon. Nor does it describe what actions could be performed at Northrup Canyon to protect and enhance important resources. However, we refer the reader to the Service’s 1998 and 1999, Planning Aid Memorandums on the Banks Lake RMP (U.S. Fish and Wildlife Service, 1998 and 1999), for some information on Northrup Canyon.

In the rain shadow of the Cascade Mountains lies the Columbia Basin Plateau. This region of steppe and shrub-steppe vegetation includes most of central and southeastern Washington state where bunchgrass and sagebrush communities were historically dominant. Banks Lake is situated in the big sagebrush-bluebunch wheatgrass (*Artemisia tridentata-Agropyron spicatum*) zonal series (Daubenmire 1988). Much of the surrounding area has been converted to dryland and irrigated agriculture. Summer daytime temperatures average about 18.3° C (65.0° F) and winter daytime temperatures average -1.7° C (29.0° F) (U. S. Soil Conservation Service 1984). Annual precipitation averages 30.5 cm (12 inches).

Geologic History-

Banks Lake lies within the geographic feature known as the Grand Coulee. The Grand Coulee was cut by historic glacial floods when they were temporarily diverted from the Columbia River by glacial ice blockages. Flood waters had formed when an ice dam blocked the Clark Fork River in the Bitterroot Mountains and created a vast impoundment in Montana (Daubenmire 1988). Flood waters were discharged, perhaps multiple times, when the Lake Missoula ice dam breached and cut through the Columbia Basin forming what is now known as the channeled scablands. The Grand Coulee is the largest of the flood channels and is characterized by steep basalt cliffs and extensive talus slopes.

Banks Lake History-

Banks Lake Reservoir was established in 1951 when the BOR flooded 10,926.5 ha (27,200 ac) along a 46.5 km (28.9 mi) section of the upper Grand Coulee between two earth-filled dams (Wolcott 1964). A pumping plant lifts water from the Franklin D. Roosevelt Reservoir, situated on the Columbia River, up 111.2 m (365 ft) into the 2.5 km (1.6 mi) Feeder Canal into Banks Lake (Stober et al. 1979). Banks Lake's primary function is that of an equalizing reservoir for the Columbia Basin Irrigation Project. Irrigation water is withdrawn from the south end of the lake at Dry Falls Dam. From here, the water diversions meet agricultural requirements on about 670,000 acres of farmland included as Columbia Basin Project lands (Stober et al.1979).

Evaluation Methodology

The Environmental Impact Statement (EIS) for the drawdown will be developed using existing data from all available sources. Much of the information has been developed and compiled during the writing of the Banks Lake Resource Management Plan (RMP). Information on many of the individual resources and the impacts to those resources will be taken from that recent document. If there are specific resources that will be impacted differently than what was described in the RMP and future EIS, then those impacts will be developed and examined. One resource that should have some impacts different from the RMP is soils and the resultant erosion occurring at the reservoir. However, the information needed to describe impacts is included in the RMP and will be used in this document. The BOR is developing some new data on water quality for this Coordination Act Report (CAR) and this drawdown may give us an indication of impacts from a larger drawdown perspective. This data is being developed by using electronic equipment to measure water quality parameters across the reservoir in three transects and comparing results against data gathered at other surface elevations to determine if drawdown affects the quality or stratification of temperature regimes, dissolved oxygen or other parameters. However, it is anticipated that the drawdowns will not impact water quality in the reservoir or the delivery system.

Fish and Wildlife Resources

Much of the following information on fish and wildlife species present, or potentially present, within the Banks Lake RMP study area was taken from the Service’s 1998 and 1999 Planning Aid Memorandums for the Banks Lake RMP and the actual Banks Lake RMP. Results in those documents were from a variety of surveys and observations of wildlife and habitat during studies in 1997, 1998, and 1999 as well as published literature and other databases. More detailed information on species within the study area can be found in those documents.

Birds-

A total of 151 species of birds were observed within the study area during the Service's studies. Only two additional species have been confirmed through Smith et al. (1997) and WDFW's Wildlife Heritage Database. Breeding evidence was observed for fifty-five species, with a breeding record for one additional species, Clark's grebe (*Aechmophorous clarkii*) in Smith et al. (1997).

<u>Raptors</u> - The presence of large amounts of excellent raptor nesting habitat in the basalt cliffs and diversity of other habitat within the study area has resulted in a high diversity of raptors using the study area. This is perhaps best highlighted with the nesting peregrine falcons, nesting bald eagles, large wintering concentration of bald eagles, and nesting by other sensitive species. Eleven raptor species were observed during Service studies, with many nesting in the study area.

Bald eagles were the most common raptor observed during raptor surveys. They were found around the entire lake, typically perched in larger trees along the shoreline, usually either black cottonwood or ponderosa pine. They also perched on rocky islands and outcrops near the shore and on rock outcrops up to 0.8 km (0.5 mi) from shoreline (sometimes very high on the cliff face), and on ice late in winter. Most of the large trees along the shoreline were used by eagles sometime during the winter, and about a dozen specific trees almost always contained one to ten eagles. The general locations of those trees are included on the enclosed figures.

Bald eagles observed during counts at the communal roosts near Osborn Bay and lower Northrup Canyon perched on dead limbs and snags of ponderosa pine and Douglas-fir. The high count in 1998 was 126 eagles with an average count of 63 birds for that year. The high count in 1999 was 63 eagles with an average count of 46 birds. Northrup Canyon likely contains the largest bald eagle communal roost in eastern Washington.

Bald eagles have nested for several years at a site on the north side of Steamboat Rock. One chick was in the nest on June 2, 1998. In 1999, there was no nesting activity at that nest; however, a new nest was discovered near Osborn Bay. At least one eaglet fledged from this nest. In 2001, there was an active bald eagle nest on the south end of Steamboat Rock.

In 1991, the WSPRC and WDFW cooperatively developed and adopted the conservation measures described in the *Steamboat Rock Bald Eagle Nest Territory Management Plan*. The purpose of the management plan is "to create site-specific management procedures that maintain a productive eagle nest territory and integrate the management interests and goals of the land managers" (WDFW 1991). The emphasis of the plan is to preserve nesting, roosting, and foraging habitats in the Steamboat Rock bald eagle nesting territory.

Potential threats to bald eagle nesting at Banks Lake are habitat loss and disturbance during the nesting cycle. In the two nesting territories, however, significant impacts from the physical loss of habitat are not expected and disturbance is likely the most serious threat. Although the

Steamboat Rock nesting pair became established and successfully nest adjacent to intense recreational activities in the state park (for example, a popular boat-in campground is located near the nesting site), the impact of human disturbance would be expected to increase as nearby recreation activities and public awareness of the nesting eagles rise. The nest at Osburne Bay was "lost" in 2001. It was likely blown out by hight winds. It was active (adults present at nest site) in May 2001, but the nest and adults were gone when visted by WDFW biologists in June 2001. The nest tree at the south end of Steamboat Rock is potentially in jeopardy because it could be cut down by beaver. Again, the greatest "threats" to this site as well as the Osburne Bay site, however, is likely human disturbance in addition to loss or reduction of food resources (i.e. waterfowl and fish).

Prairie falcons (*Falco mexicanus*) were observed during the breeding season at several locations on or near basalt cliffs. Breeding was confirmed for two of these sites (Steamboat Rock and Northrup Canyon). Peregrine falcons (*Falco peregrinus*) were observed using eyries on the basalt cliffs at the Million Dollar Mile and along the cliffs on the southwest side of the lake. Currently, a total of four active nests are present at these respective sites.

Current and future management actions should consider the well-being of this group of species. For example, nesting areas should be protected from potentially disturbing activities and adverse impacts to prey species should be avoided or at least minimized.

<u>Colonial-nesting Birds</u> - The three islands being used by colonial-nesting birds at the southern end of Banks Lake are an important resource in the study area. Birds observed using these islands during Service studies included great blue heron (*Ardea herodias*), black-crowned night-herons (*Nycticorax nycticorax*) California gulls (*Larus californicus*), ring-billed gulls (*Larus delawarensis*), and Caspian terns (*Sterna caspia*). Canada geese and mallard nest on these and other islands in the lake. Activities on or near the islands, which may disturb nesting birds, should be prohibited. The birds seem tolerant of fishing boats in the vicinity; however, they become very disturbed when people attempt to walk on the islands. It may be necessary to post signs on the islands if future monitoring reveals significant disturbance to nesting birds.

Nesting colonies of western grebes (*Aechmophorous occidentalis*) occur within the study area at Osborn Bay and Devils Punch Bowl, and are present in smaller numbers at other sites. They nest in the cattails and bulrushes along the edge of the lake, creating a floating vegetation mat which is anchored to the surrounding vegetation. Breeding colonies or concentrations of western grebes are listed as Priority Species by WDFW (WDFW 1996). Priority Species are those fish and wildlife species requiring protective measures and/or management guidelines to ensure their perpetuation (WDFW 1996).

The well-established western grebe colonies should be protected from potential adverse impacts. Adverse impacts could result from significant water level changes during the breeding season, large wakes from boats and personal watercraft, and other activities which disturb nesting birds, such as personal watercraft passing through emergent vegetation. A study to determine the reproductive success of western grebes in the study are would help determine the level of management that should be applied to protect these birds.

<u>Waterfowl</u> - An excellent diversity of waterfowl was observed during Service studies with twenty-two species recorded and breeding was confirmed for ten species. Primary waterfowl use during the breeding season occurred below Dry Falls Dam, Devils Punch Bowl, and Osborn Bay. More scattered use was in the smaller bays and inlets on the main lake and other wetlands. Waterfowl use was heaviest and contained the highest diversity of species throughout the field season in the various wetlands and ponds below Dry Falls Dam. Also, more broods were observed in this area than in the rest of the lake. Care should be taken to protect wetlands and adjacent upland habitats and reduce potential adverse impacts to this area from grazing, recreational uses, and any proposed developments or management changes.

<u>Shorebirds</u> - A good diversity of shorebirds was found using the Banks Lake study area; however, their numbers were low. It is likely that shorebirds are normally found in low numbers in the study area during migration and breeding seasons because there are small amounts of suitable habitat present. Some increase in habitat could be provided by managing water levels differently; however, the BOR has indicated that water level management must be tied to irrigation schedules. The area with the highest shorebird use was the area below Dry Falls Dam. Care should be taken to protect wetlands and reduce potential adverse impacts to this area from grazing, recreational uses, and any proposed developments or management changes.

<u>Neotropical Migratory Birds</u> - Neotropical migratory birds (NTMB) are species which breed in the United States and Canada and then migrate south to Mexico, Central or South America or the Caribbean to spend the winter. They do not include waterfowl, shorebirds, or herons and egrets, even though some species in these groups also winter south of the Mexico-United States border. There is widespread concern about the future of NTMB (Andelman and Stock 1994), since many of these species have experienced large population declines due to habitat destruction on the breeding grounds, wintering areas and along migration routes.

There were sixty-six species listed as neotropical migratory bird species which were observed during the Service's study, or otherwise documented within the study area. In addition to riparian/wetland habitats, which is important for two-thirds of the NTMB within the study area, mesic shrub and shrub-steppe habitat are also important to several species.

<u>Other Sensitive Bird Species</u>- There is anecdotal evidence that common loons (*Gavia immer*), a candidate species for State listing, successfully bred in Devils Punch Bowl several years ago. During the Service's study, one loon in breeding plumage was observed in June; however, no further evidence of breeding was observed. Also, several loons were observed on the lake during September, but these could have been early migrants.

The American white pelican (*Pelecanus erthythrorhynchos*) is listed as an endangered species by WDFW. Small numbers were observed using the south portion of the lake during spring and fall migrations.

Mammals-

Thirty-four species of mammals have been documented as present within the study area according to past records. Threatened and endangered species present included the pygmy rabbit (*Brachylagus idahoensis*), a Federal and State listed endangered species, Washington ground squirrel (*Spermophilus washingtoni)*, a candidate species for Federal listing. In addition, five bat species which are Federal species of concern, are likely present in the area, but have not yet been documented.

Pygmy rabbits were the only mammals actively surveyed for by the Service in the study area, although time did not permit a complete and thorough search of the study area. Scat and burrows of the size used by pygmy rabbits or other species such as young Nuttall's cottontails (*Sylvilagus nuttalli*) were found in the study area. These observations are crucial considering the pygmy rabbit has been recently listed under the ESA. However, the Service was unable to positively confirm the presence of pygmy rabbits during these surveys of the study area.

Amphibians and Reptiles-

Eleven species of amphibians and reptiles have been documented within the study area. Surveying suitable habitat in the spring, when toads and frogs are calling, would likely have resulted in more amphibian species observed. The only documented record of the Columbia spotted frog (*Rana luteiventris*), a Federal species of concern and a State candidate species, was in 1937. It was collected just east of Steamboat Rock at a stream which flows into Devils Punch Bowl. We would recommend future surveys especially if proposed activities may affect wetlands. Surveys may help reveal distribution and abundance of Columbia spotted frog.

Fishery Resources-

Many of the fish species present in Banks Lake were pumped in from FDR Lake on the Columbia River. However, a few species originated in the small lakes that existed in the upper Grand Coulee prior to inundation and from the stocking programs carried out by state agencies. No official records were made of the fish fauna in these small lakes. Information from local fishermen indicated that before inundation, dense populations of largemouth bass (*Micropterus salmonides*) and pumpkinseed sunfish (*Lepomis gibbosus*) existed (Thomas 1978).

Shortly after inundation, a substantial population of largemouth bass developed as indicated by Washington Department of Game (WDG) catch records from 1952 through 1954 (Nelson 1954). Largemouth bass and sunfish dominated catches in these years and represented sixty-four and thirty-two percent of the catch, respectively (Nelson 1954). Yellow perch (*Perca flavescens*), rainbow trout (*Oncorhynchus mykiss*), eastern brook trout (*Salvelinus fontinalis*), kokanee salmon (*Oncorhynchus nerka*), black crappie (*Pomoxis nigromaculatus*), burbot (*Lota lota*), and bull trout (*Salvelinus confluentis*) were also identified in the 1952-1954 catches (Nelson 1954 and Spence 1965).

Irrigation water pumped from FDR Lake was the source of kokanee salmon, burbot, bull trout, and possibly rainbow and eastern brook trout sampled in early 1950's creel surveys. Black crappie may have been an early illegal introduction (Duff 1973). Only four bull trout were recorded in 1954 creel checks. With no available spawning habitat, bull trout never became established in the reservoir. Eastern brook trout also failed to establish a reproducing population and both species of char disappeared from catch and gill net survey data.

A gill net and beach seine survey conducted in Banks Lake between 1973 and 1975 found the following additional species for which there are no records of introduction: peamouth chub (*Mylochelius caurinus*), northern pikeminnow (*Ptychochelius oregonensis*), carp (*Cyprinus carpio*), longnose sucker *(Catostomus catostomus*), largescale sucker (*Catostomus macrocheilus*), bridgelip sucker (*Catostomus columbianus*), brown trout (*Salmo trutta*), mountain whitefish (*Prosopium williamsoni*), lake whitefish (*Coregonus clupeaformis*), brown bullhead (*Ictalurus nebulosis*), walleye (*Stizostedion vitreum*), bluegill sunfish (*Lepomis macrochirus*) and prickly sculpin (*Cottus asper*). Only one brown trout was sampled and suitable spawning habitat for the species does not exist in the system. With the exception of char, brown trout and rainbow trout, all of the other fish present in pre-reservoir lakes or drafted from FDR Lake were able to establish reproducing populations to various degrees.

Additional species which were found in Banks Lake after 1975 and/or are still present include yellow bullhead (*Ictalurus natalis*), white catfish (*Ictalurus catus*), channel catfish (*Ictalurus punctatus*) and smallmouth bass (*Micropterus dolomieui*). While the smallmouth bass were intentionally stocked, the others may have been illegally introduced.

The WDG (currently the WDFW), through continuous plants, developed substantial populations of rainbow trout (Thomas 1978). More irregular plants of kokanee have been made from the 1950's through the present. The Washington Department of Fisheries (currently the WDFW) planted coho salmon (*Oncorhynchus kisutch*) in 1971 and chinook salmon (*Oncorhynchus tschawytscha*) in 1974 and 1975. These introductions produced a brief fishery for chinook and coho salmon but plants were discontinued and no spawning habitat was available to establish naturally spawning populations.

<u>Kokanee</u> - Along with rainbow trout and perch, kokanee came to dominate the catch in Banks Lake during the 1960's through the 1970's. This fishery was supported primarily by beach spawning at five natural production areas around the lake shore (Duff 1973), with spawning success dependent upon fall-winter and spring reservoir levels (Thomas 1978). The kokanee fishery began to fail in the late 1970's and anglers ceased to target kokanee in the mid-1980's. Large plants of kokanee in the 1990's have failed to restore a targeted kokanee fishery in Banks

Lake. Despite a barrier net at the outlet, significant numbers of small kokanee continue to be entrained downstream soon after stocking. This is evidenced by the catch of kokanee at unstocked Billy Clapp Reservoir, downstream from Banks Lake (WDFW 1997).

As the ecosystem in Banks Lake has matured, the original fertility of the lake has been changed by an increased biosystem complexity tying up much of the lake's nutrients. Average reservoir outflow has increased 40 percent since the 1960's, reducing water retention time in the reservoir. Lower water retention times have further reduced fertility and reduced the availability of zooplankton. The present zooplankton biomass may be insufficient to support juvenile kokanee at the life stage normally stocked (WDFW 1996b). Since 1996, kokanee are reared in relatively small numbers to a larger size in net pens at Electric City and Coulee City before planting to address predation and food availability problems. A few anglers who still target kokanee report that kokanee fishing has improved since 1997 (Korth 1998).

Rainbow trout - With a catch of 20,170 in 1965, rainbow trout were one of the three dominant sport fisheries in Banks Lake during the 1960's (Spence 1965). A thirty-four percent decrease in the catch from the 1965 survey was noted during a 1971-72 survey (Duff 1973). To reduce predation on recently stocked juveniles, hatchery rainbows are raised to a larger size in net pens at Electric City and Coulee City before planting. This program increased returns to the fishery as rainbow trout are presently the dominant cold water sport fish in Banks Lake.

Lake whitefish - The introduction of lake whitefish into Banks Lake was apparently from FDR Lake. Lake whitefish first appeared in the catch in 1965 (Spence 1965). There is an abundance of shoreline habitat in Banks Lake suitable for spawning.

Yellow perch - The abundance of yellow perch was low during the early years of Banks Lake (Nelson 1954); however, since the 1960's, they have been the dominant fish by number in the Banks Lake catch. A high reproductive potential, coupled with flexibility in habitat and feeding requirements, have made them one of the most abundant species in the lake.

Largemouth bass - Largemouth bass dominated the Banks Lake fishery in the 1950's (Nelson, 1954). The largemouth bass fishery increased in both catch and intensity in the 1970's. The increased intensity of bass fishermen stemmed from rapid advances in bass fishing technology and the advent of several national bass fishing organizations (Zook 1978). Although largemouth bass numbers appear to be declining, it is difficult to determine the present trend in the Banks Lake largemouth bass population in the absence of accurate data (Foster 1998; Korth 1998). Increases in the carp population and a gradual loss of cover may have resulted in a decrease in bass fry survival.

Smallmouth bass - Smallmouth bass were introduced to Banks Lake in 1981 by WDG to increase species diversity and the number of bass available to anglers. Smallmouth utilize the steep littoral zone habitat prevalent in Banks Lake better than largemouth bass which, though widespread throughout the lake, are confined to preferred areas of shallow water habitat.

Walleye - Walleye became established in FDR Lake in the late 1960's. Fish drafted from FDR Lake were able to establish a reproducing walleye population in Banks Lake by the late 1960's (Duff 1973). Supplemental plants of walleye have been made infrequently since 1992 with the bulk of recruitment coming from natural reproduction.

Sunfish and crappie - During the warmer months of the year, crappie and sunfish provide a popular shore fishery. The large size of crappie at spawning indicates that the lake's population is probably relatively small. The pumpkinseed sunfish fishery peaks in August. Bluegill sunfish were probably illegally introduced into Banks Lake and very few are caught (Duff 1973).

Catfish and bullhead - Brown bullhead provide a limited fishery. They probably were part of the pre-stocking species composition of Banks Lake but may have been illegally introduced. White and channel catfish and yellow bullhead have also been reported in recent catches (Foster 1998) and are probably the result of illegal introductions.

Burbot - Large catches of burbot were made in the 1960's with some individuals creeling approximately 1,000 pounds per night (Duff 1973). The fishery rapidly diminished through the 1970's and burbot disappeared from the lake by the early 1980's (Bonar 1997). Over fishing, reduction of adult spawning stocks, slow growth, predation, and a temporary dip in prey numbers (lake whitefish) have been suggested as agents in the disappearance of burbot from Banks Lake (Duff 1973; Bonar 1997). An attempt was made in 1988 to reintroduce burbot to Banks Lake, but no fish were sampled or caught until fall 2000 and fall 2001 when WDFW sampling of Banks resulted in the appearance of burbot.

Federally-Listed Threatened and Endangered Species-

Bull trout - Although Dolly Varden (*Salvelinus malma*) is currently distinguished as a distinctly separate species from bull trout (*Salvelinus confluentus*), they were considered to be the same species until the late 1970's. The Columbia River bull trout populations were listed as threatened under the Endangered Species Act in June 1998 (USFWS 1998), while Dolly Varden populations were not included in this listing. Bull trout are also a candidate species for listing as threatened or endangered in Washington State (WDFW 2002a). These closely related char species are difficult to distinguish in the field and have similar if not identical life histories (Mongillo 1993). Therefore, the following discussion of bull trout is generally applicable to Dolly Varden.

Eight potential bull trout subpopulations have been identified in the Wenatchee, Entiat, and Methow Rivers, while they are thought to be extirpated from the Okanogan River. However, bull trout were likely never abundant in the mainstem Columbia River (Mongillo 1993). Factors identified in the decline of bull trout populations in the area include dams, forest management practices, livestock grazing, agricultural water diversions, roads, and mining (Beschta et al. 1987). In addition, poaching and the presence of non-native fish species are adversely impacting bull trout populations (Mongillo 1993). Brook trout may have completely replaced bull trout in the South Fork Beaver Creek, a tributary of the Methow River.

Four general forms of bull trout are recognized (anadromous, lacustrine, fluvial, and resident), each exhibiting a specific behavioral or life-history strategy (Brown 1992a; Pratt 1992). Anadromous bull trout are typically found in coastal and Puget Sound river drainages, yet are extinct in the Mid-Columbia River region (Nehlsen et al. 1991). The lacustrine (adfluvial) form matures in lakes or reservoirs and spawn in tributaries, where the young reside for 1 to 3 years. Fluvial bull trout have a similar life history, except that they move between the Columbia River mainstem and smaller tributaries.

The lacustrine and fluvial bull trout are of the most concern in the Mid-Columbia River tributaries (Brown 1992a), as their habitat has been degraded more than that for resident forms. The stream resident bull trout spend their entire lives in smaller, high-elevation streams, apparently moving very little, and seldom reaching a size larger than 12 inches (Brown 1994). Resident trout may have extensive seasonal movements or change life-history strategies (from resident to lacustrine) depending upon the current environmental conditions. This phenomenon may occur commonly for populations near Lake Wenatchee, where resident bull trout may migrate to the lake when stream flows (and attendant water temperatures) become intolerable. Habitat alterations that disrupt this capability to transmute may limit the populations stability.

To gather additional information on bull trout migratory behavior in the Mid-Columbia River region, a two-year radio-tagging study began in 2001 (BioAnalysts, Inc. 2002). Data collected in this study indicate that some bull trout spend considerable periods of time rearing in the mainstem reservoirs and pass upstream through the adult fishladders to enter tributary areas, and some pass back downstream through the dams after exiting the tributary areas. Although it is not know how these downstream migrants pass the projects, there is no evidence of project-related mortality based on the data to date. As a result, bull trout are subject to impacts from the operation of the projects, although little evidence is available to estimate the magnitude or nature of these impacts. Additional radio-tagging studies are being conducted to evaluate bull trout migration and rearing behavior in the Mid-Columbia region.

Bald eagle - Suitable habitat includes those areas that are close to water and provide a substantial food base such as along rivers containing anadromous fish, good populations of resident fish, abundant waterfowl and mammal populations. Bald eagles are often found along the shores of reservoirs and rivers. Territory size and configuration are influenced by availability of perch trees, quality of foraging habitat and distance of nests from water supporting adequate food supplies.

Bald eagles usually nest in the same territories each year and often use the same nests repeatedly (Anthony and Isaacs 1989). Nest trees typically provide an unobstructed view of an associated water body and are often situated in prominent locations. Snags, and trees with exposed lateral limbs or those with dead tops often occur in nesting territories and are used as roosts, perch sites or access points to and from the nest.

Bald eagle winter habitat is mostly associated with areas of open, ice-free water where fish are available and/or waterfowl congregate (Stalmaster 1987). Additionally, eagles may be scattered throughout upland areas feeding on ungulate carrion, game birds, and rabbits (Swenson et al. 1981). The majority of the bald eagles wintering in central and eastern Washington are migrants (Fielder 1992). Some move relatively short distances to lower elevations or inland for food sources. Most eagles that breed in the Pacific Recovery Area winter in the vicinity of their nests.

As mentioned above, bald eagles have recently nested at two locations within the study area. Because of the large size of the communal roost, and the late dates that eagles were observed in the area, the potential exists for nesting attempts by additional eagles in the future. Recent nesting success was documented in 2001 (as discussed in the aforementioned "*Raptors"* discussion) at Banks Lake in which three active bald eagle nests produced surviving young

There has been and will continue to be mature cottonwoods along the shoreline which are lost due to erosion. This erosion is especially prevalent on Steamboat Rock Peninsula. The RMP should ensure that a complement of mature cottonwoods are maintained along the Banks Lake shoreline and conditions are sufficient to provide for long-term propagation and growth to ensure presence of mature cottonwoods into the future.

<u>Ute ladies'-tresses</u> - This perennial orchid was listed as threatened in 1992. It was discovered in southeastern Idaho in 1996 along the upper Snake River and in 1997 in northern Washington. Ute ladies'-tresses (*Spiranthes diluvialis*) is typically found in wetland and riparian areas, including spring habitats, mesic to wet meadows, river meanders, and floodplains. This species may be adversely affected by habitat modifications associated with livestock grazing, vegetation removal, excavation, construction activities, stream channelization, and other actions that alter hydrology or vegetative cover. Potential habitat for this plant within the study area was surveyed in 1999. There was only a small amount of habitat found that could be used by this species and no Ute ladies'-tresses were found. Furthermore, commonly associated species, such as beaked spikerush (*Eleocharis rostellata*), were not found. Heavy grazing in riparian areas may have precluded the identification of this species. The most likely areas for this species include the two perennial streams which enter Banks Lake from the northwest, and some of the springs and seeps within the study area. Additional plant surveys should be conducted at these sites, in August or September, before activities are initiated which may potentially impact this plant.

<u>Pygmy rabbit</u> - Smallest of North American rabbits, pygmy rabbits are found in sagebrush-dominated areas and prefers areas with relatively deep, loose soil (WDFW 1995a). Within Washington, their range has been reduced to only five known isolated fragments of habitat in Douglas County. They are listed as endangered by WDFW. Surveys did not confirm presence of pygmy rabbits in the study area. Surveys should be done before future activities are allowed which could negatively affect shrub-steppe communities within the study area.

This small population exists in Douglas County, and has declined dramatically over the past decade. The Service is working closely with the Washington Departement of Fish and Wildlife

(WDFW) in a captive breeding program to maintain some of the rabbits. The Service has also met with local farmer and ranchers to determine how they can help stabilize the population. On November 30, 2001, the Service listed the Washington population of pygmy rabbit as endangered.

Western sage grouse - The western sage grouse (*Centrocercus urophasianus phaios*) is a large grouse that inhabits the shrub-steppe and meadow steppe regions of eastern Washington (Hays et al. 1998b). Suitable sage grouse habitat is typically sagebrush/bunchgrass stands having medium to high canopy cover with a diverse understory. They use sagebrush year round for food and cover, with a high forb use in summer. The drastic reduction in numbers and distribution of sage grouse in Washington is attributed primarily to loss and degradation of habitat (Hays et al. 1998b). They are now listed by WDFW as a threatened species. Although no known documented records of sage grouse existed within the study area, there are several records close to the boundary and the study area for the recently-issued Banks Lake RMP that fall within the current range of this species.

Candidate Species-

Washington ground squirrel - Washington ground squirrels (*Spermophilus washingtoni*) are found in steppe and open shrub-steppe, where it prefers deep, loose soil for digging burrows. It has been documented within the southeast portion of the study area several years in the past.

Other Species of Concern-

Black tern - Black terns (*Chlidonias niger*) are a relatively small tern which primarily eat insects. They occur statewide, in or near freshwater marshes, ponds, or lakes. Most breeding records are in the northeastern portion of the state, although there is a large colony on Goose Lake on the Colville Reservation and some colonies in Douglas County and Grant County. They usually nest in marshy wetlands in June; however, breeding records do not exist for the study area. They would most likely be found within the study area during spring and fall migrations.

California floater - This mussel is found in unpolluted fresh water, except small creeks. California floaters (*Anodonta californiensis*) prefer lakes and slow streams in areas less than 6.6 feet (2 m) deep and having sandy bottoms. Adults will also live on mud bottoms. Juveniles are parasitic on gills, fins and barbels of host fish. This species has not been documented at Banks Lake.

Columbian sharp-tailed grouse- This subspecies of sharp-tailed grouse *(Tympanuchus phasianellus columbianus)* is the rarest of the six in North America and the only one found in Washington. It is listed as threatened by WDFW They use a variety of habitats, including: shrub-steppe, grassland, mountain shrub, and deciduous riparian habitats. This species has declined substantially in numbers and distribution in Washington primarily because of loss and degradation of habitat (Hays et al. 1998a). This species has been documented in the past in

Barker Canyon in or adjacent to the study area. There is some anecdotal evidence that they were also found in Norhtrup Canyon.

Columbia spotted frog - Columbia spotted frogs are found in warm water marshes, overflow wetlands, and bogs with non-woody wetland vegetation. They occur scattered across most of eastern Washington and have been documented within the study area.

Fringed myotis - Fringed myotis (*Myotis thysanodes*) is a bat which is associated with arid forest, desert, and arid grassland, especially near riparian areas. It roosts in caves, mines, rock crevices, and buildings. While this species has not been documented at Banks Lake, there are several recent records in similar habitat west of Banks Lake in Moses Coulee.

Loggerhead shrike - Loggerhead shrikes (*Lanius ludovicianus)*are robin-sized birds which feed primarily on insects, with small birds and mammals taken in winter. Preferred habitat includes shrub-steppe and any semi-open area with shrubs, fences, power lines or small trees for perches. Six loggerhead shrikes were observed in the study area during 1998 breeding season surveys.

Long-eared myotis - The long-eared myotis (*Myotis evotis*) is more of a forest dweller which roosts in trees, buildings, and rock crevices. It forages over and around trees, and near water courses in arid regions. This species has not been documented at Banks Lake but would likely occur.

Northern sagebrush lizard - The northern sagebrush lizard (*Sceloporus graciousus graciousus*) is primarily a shrub-steppe dweller, but also uses bouldered regions and forested slopes. They are typically a ground lizard and rarely climb into shrubs. They prefer fine gravel soils, but also occur on sandy or rocky soil. They require rock crevices, mammal holes or similar cover for refuge. This species has not been documented at Banks Lake.

Olive-sided flycatcher - The olive-sided flycatcher (*Contopus borealis*) seems to prefer mixed and broken forests with wooded streams and some wetland. The diet consists entirely of flying insects which they search for from high snags and perches. They typically nest high in conifer trees and would most likely be found in Northrup Canyon.

Pale Townsend's big-eared bat - Pale Townsend’s big-eared bat (*Plecotus townsendii pallescens*) occurs in a variety of habitats from grasslands to forested areas. It roosts in trees, buildings, and caves and is one of the few bats in Washington which forages more in upland areas than over water or in riparian habitat (Johnson and Cassidy 1997). While this species has not been documented at Banks Lake, there are several recent records in similar habitat west of Banks Lake in Moses Coulee.

Petrophyton cinerascens - (Chelan rockmat) - This plant is a local endemic known only from recent records in Douglas and Chelan counties (WNHP 1997). While the records have all been along basalt cliffs and bluffs along the Columbia River, the basalt cliffs in the study area may also provide suitable habitat.

Phacelia lenta (sticky phacelia) - This plant is a local endemic known only from recent records in Douglas County (WNHP 1981, 1997). While the records have all been along the basalt cliffs of the Columbia River, the basalt cliffs in the study area may also provide suitable habitat.

Small-footed myotis - The small-footed myotis (*Myotis ciliolabrum*) occurs in open, arid areas and commonly forages around cliffs, rock outcrops, and dry canyons (Johnson and Cassidy 1997). It roosts in cavities in cliffs, vertical banks, the ground, talus slopes, and under rocks. While this species has not been documented at Banks Lake, there are several recent records in similar habitat west of Banks Lake in Moses Coulee and it likely occurs here.

Western burrowing owl - The western burrowing owl (*Athene cunicularia hypugea*) is generally found in open, broken or flat areas, including shrub-steppe and agricultural areas. An opportunistic feeder, it preys primarily on insects and small mammals, but also birds, fishes and amphibians, when available. They use ground squirrel or other mammal burrows for shelter and nesting. This species has not been documented at Banks Lake.

Yuma myotis - Yuma myotis (*Myotis yumanensis*) is a bat that occurs in forested areas, forest edge, and open areas such as arid grasslands. It is more closely associated with open water than any other Washington bat (Johnson and Cassidy 1997). It roosts in caves, trees, and buildings. A large night roost (1,000 +) of this species has been identified within the study area near Northrup Creek.

Wildlife Habitat-

The Banks Lake RMP study area consists of a diversity of habitat types. Shrub-steppe is dominant across the landscape. Other habitat associations include rock/talus slopes, mesic shrub, wetland/riparian, grasslands, and occasionally forest. Much of the following information on habitat was found in the Service's Planning Aid Memorandums for the Banks Lake RMP (1998 and 1999). More detailed information on habitat can be found in those documents.

Shrub-steppe - Shrub-steppe is the climax upland habitat association over the majority of the study area. Three types of shrub-steppe were present, possibly dependent on soil depth and salinity. Typically, big sagebrush (*Artemesia tridentata*) communities occurrs on deeper soils and were the dominant shrub-steppe association over the study area. Stiff sagebrush (*Artemisia rigida*) is the dominant shrub on shallow and rocky soils. Shrub-steppe on saline soils is dominated by greasewood (*Sarcobatus vermiculatus*) and inland saltgrass (*Distichlis stricta*).

There were some NTMB observed during the Service's studies or otherwise documented, which prefer, or at least commonly use, shrub-steppe habitat for breeding. Some of these include long-billed curlew (*Numenius americanus*), loggerhead shrike, Brewer's sparrow (*Spizella breweri*), and sage thrasher (*Oreoscoptes montanus*). While breeding was not documented, all species were observed within the study area during the normal breeding season.

Aside from NTMB, several other bird species documented in the study area use shrub-steppe habitat for nesting and foraging. Some of these bird species include: dabbling ducks for nesting; raptors preying on species found in shrub-steppe; upland game birds using this habitat for cover; aerial insectivores, such as white-throated swift, swallows, and common nighthawk, feeding above this habitat; and, several passerine species such as, northern shrike (*Lanius excubitor*), and song sparrow using this habitat for nesting. Other species found in this habitat included furbearers, small mammals, Nuttall's cottontail, porcupine *(Erethizon dorsatum*), and some amphibians and reptiles.

The presence of several shrub-steppe dependent bird species, NTMB species, and use by many other birds; several mammal species, and amphibians and reptiles, indicates that at least some of the shrub-steppe habitat in the study area is in good condition. Unfortunately, shrub-steppe habitat in the Columbia Basin has suffered significant reduction from conversion to agriculture, overgrazing and other factors (Dobler et al. 1996). This has helped reduce distributions and populations of several wildlife species, causing many to receive special designations from WDFW and the Service because of their rarity. In addition, the GAP analysis of Washington State (Cassidy et al. 1997) found that the largest gap in the protection of biodiversity in Washington is in the shrub-steppe zone. Updating the GIS work that was done at Banks Lake would be valuable.

Much of the original shrub-steppe habitat adjacent to the study area has been converted to irrigated or dry croplands. Many native wildlife species occupying the Columbia Plateau have been declining over the past three decades due to the loss of habitat caused by intensified farming, burning, herbicide spraying, and livestock overgrazing. Where agricultural areas are interspersed with native shrub-steppe, riparian/wetland areas, or with uncultivated lands, they provide habitat for introduced game birds such as ring-necked pheasant (*Phasianus colchicus*), California quail (*Callipepla californica*), chukar (*Alectoris chukar*), and wild turkey (*Meleagris gallopavo*).

Shrub-steppe species with no documented presence in the study area, such as western sage grouse or sharptail grouse, could benefit if larger blocks of good quality shrub-steppe habitat were present in the area. There are several records of this species near the study area boundary and with improvements in habitat they may begin using the study area.

The better quality shrub-steppe habitat (such as that present at the ORV area) needs to be protected to ensure it is maintained or even improved over time. These areas often have few non-native plant species present and have an intact cryptogamic crust on the soil. Overgrazing, fire, indiscriminate motorized travel and other activities could have an adverse affect on these areas.

Grasslands - Grasslands are uncommon on the study area and are generally the early successional phase of shrub-steppe. Some grassland areas showed evidence of recent fire and contained young shrubs. We defined grasslands as those areas containing less than five percent shrub cover. Typical native grasslands contained bluebunch wheatgrass *(Agropyron spicatum)*, needle-and-thread (*Stipa comata*), along with cheatgrass (*Bromus tectorum*). Many areas identified as grassland more closely resembled weedy fields with several weedy forbs dominant and plant diversity relatively low.

Wetland/Riparian areas - Wetland and riparian areas are common along the lakeshore; frequently are found in low depressions within upland areas; and are associated with springs, seeps, and perennial streams. Wetland/riparian types include ponds, perennial wetlands, seasonal wetlands, nonforested riparian, and forested riparian areas. There are some unique vernal pool wetlands on top of Castle Rock. There are also some marshes along the shoreline which are dominated by bulrush (*Scirpus sp.*) and cattail (*Typha*). Those marshes at Devils Punch Bowl and Osborn Bay are heavily used by waterfowl, and other waterbirds, such as colonies of western grebes. The riparian/wetland areas within the study area are important habitats to several species of wildlife including waterfowl, shorebirds, common snipe (*Gallinago gallinago*), some raptors, many passerines such as yellow warbler (*Dendroica petechia*), and amphibians. Aside from providing essential habitat for some species which must have riparian and/or wetland areas, they also provide drinking water, food (i.e. submergent, aquatic plants and macro-invertebrate forage resources for fish species) , and cover for many terrestrial wildlife species including muskrat, beaver, mink, and raccoon.

Spring and seep areas are dispersed throughout the Banks Lake area. The larger ones, such as Behne Springs and some near the northern border of the study area, together with their associated riparian plant community, provide surface water, cover, and forage for many wildlife species including NTMB, raptors, game birds, deer, and small mammals. Several perennial springs which enter the northwest portion of the study area provide important habitat and corridors. Unfortunately, cattle attracted to the year-round water sources, have negatively impacted these habitats through overgrazing and trampling.

Riparian areas are estimated to provide less than one percent of the land base in the Pacific Northwest yet support the greatest diversity and abundance of wildlife that exist in the arid portions of the region (USFWS 1990). WDFW (1995b) states that about 90 percent of Washington's land-based vertebrate species use riparian habitat for essential life activities. They point out that the high wildlife value of these areas is derived from the structural complexity of vegetation, connectivity with other ecosystems, high edge-to-area ratio, abundant food, water and a moist and mild microclimate. Unfortunately, quality riparian habitat has become relatively rare in the Columbia Basin due to arid conditions and land use activities such as grazing, conversion to cropland, and the inundation of lands by reservoirs. Since that inundation at Banks Lake, willow and black cottonwood areas have developed along the margin of Banks Lake and below Dry Falls Dam.

The timing and magnitude of reservoir fluctuations and drawdowns can impact the development of wetland and riparian vegetation along the lake margin in addition to the submergent, aquatic plant and aquatic invertebrate components. The maintenance of reservoir levels at or near full pool elevations during the winter season may have accelerated the loss of mature riparian cottonwoods and willows regularly used by roosting bald eagles and other raptors. The loss of this riparian component may primarily be the result of shoreline undercutting and erosion by wave action when the reservoir is at or near full pool.

Forested areas- Forested or mature conifer areas are uncommon overall, although several forest types occur within the study area. Upland forested areas include a granitic canyon located in the northeast part of Osborn Bay. This area is dominated by Douglas-fir (Pseudotsuga menziesii) and in lesser amounts by ponderosa pine (Pinus ponderosa), chokecherry, mockorange (*Philadelphus lewisii*), rose (*Rosa sp.*), serviceberry *(Amelanchier alnifolia*), and bluebunch wheatgrass. The north slope of Castle Rock is forested by second growth ponderosa pine and Douglas-fir. These stands are best developed at the base of long, basalt talus slopes. The forest grades abruptly into shrub-steppe. Other small areas of forest are found in association with the granitic islands and rock outcrops found in the vicinity of Devils Punch Bowl, Kruk's Bay, Eagle Rock, Jones Bay, and Lovers Lane. Furthermore, scattered throughout the upper reservoir's hummocky granitic islands and rock outcrops are individual ponderosa pine, Douglas-fir, and quaking aspen (Populus tremuloides) trees. The forested areas are generally not dense enough or occur in such small patches that they would not support substantial populations of some woodland wildlife (for example, black bear). However, they do provide habitat for raptors, NTMB, and numerous other non-game birds and small mammals.

Some unique forested areas within the study area consisted of quaking aspen dominated groves with a high diversity of shrub and forb species. These quaking aspen groves are associated with some water source such as springs or runoff at the base of talus slopes. Understory species in quaking aspen groves closely resemble those found in mesic shrub areas. Quaking aspen communities are not particularly characteristic of the shrub-steppe (Franklin and Dyrness 1973) and are recognized as Priority Habitats by WDFW. In addition to quaking aspen, the areas contain a diversity of deciduous tree and shrub species which are important to wildlife for food and cover. Mule deer use these areas heavily. Songbird species will nest in these areas or make use of them as migratory stopovers for feeding or roosting, particularly NTMB. Quaking aspen groves are susceptible to disturbance and alteration, especially from grazing, because of their proximity to water sources.

Finally, there are some small groves of Russian olive (*Elaeagnus angustifolia*) trees at several locations within the study area. These were probably the results of earlier plantings and they do not appear to be spreading as they very rapidly do in other parts of the Columbia Basin. Although they are non-native species and rapidly displace native species in some locations, they are providing some valuable habitat in the study area. They are used by some NTMB, game birds, raptors including numerous nesting pairs of long-eared owls, deer, and small mammals.

Unfortunately, several of these groves of trees are used as dispersed camping areas, which would disturb many of the species that would be using that habitat.

Cliffs/Talus/Mesic Shrub **-** Rock and talus slopes are very common throughout the Banks Lake area comprising the walls of the Grand Coulee. Scattered areas of sparse vegetation occurred on these slopes, ranging from grasses and forbs to shrub species. Mesic shrub habitat is common at the base of the talus, probably associated with areas of run-off or seeps. Mesic shrub areas are typically small in size but high in plant diversity. Most of the mesic shrub areas are relatively free from adverse impacts from human activities or grazing, since they are often on rugged terrain associated with the cliffs and talus slopes.

The basalt cliffs and talus slopes are habitat to several species of wildlife, including a high diversity of raptors, white-throated swifts (*Aeronautes saxatalis*), swallows, Say's phoebe (*Sayornis saya*), and reptiles. Because of the steepness and ruggedness of these areas, there are few recreational activities or management measures which could affect these habitats.

Rock-climbing is an activity which does occur within the study area and which can affect species using these habitats (for example, peregrine falcon, other raptors, white-throated swift colonies, etc.). A rock-climbing management plan should be developed which provides adequate protection to important resources. At a minimum, it should guide activities away from important nesting areas during the spring and early summer.

Noxious weeds - Noxious weeds are a common problem in the study area and generally invade and occupy sites that have been previously disturbed by fire, livestock grazing, motorized travel, and/or dispersed camping. In Washington, a weed is any plant species that is not native to the state with the exception of agricultural crops (i.e. corn, onions, and grapes). Weeds typically interfere with the maintenance of healthy and diverse ecosystems. Consequently, weed control is an integral part of resource management as non-natives can displace native plant species and are often of lower forage value to wildlife and difficult to extirpate once established. Other wildlife requisites, such as cover and nesting habitat, are also affected by the replacement of native plants by weedy species.

Cheatgrass, the most common weed found in the study area, has invaded many areas where native perennials have been overused and/or eliminated. There is little evidence that cheatgrass will relinquish a site once occupied due to its highly competitive ability. Other common noxious weeds include diffuse and spotted knapweed (Centaurea diffusa and biebersteinii, respectively), Canada thistle (Cirsium arvense), pepperweed (Lepidium latifolium), kochia (Kochia scoparia), Dalmation toadflax (Linaria dalmatica spp. dalmatica), Russian knapweed (Acroptilon repens) and purple loosestrife (*Lythrum salicaria*). Cheatgrass, knapweeds, and Canada thistle currently are the most prolific weeds present at Banks Lake.

The proliferation of these undesirable plants is controlled through the implementation of an integrated weed management program between Reclamation, the State of Washington, and the Noxious Weed Control Boards of Douglas and Grant counties. At Banks Lake, the WDFW is responsible for weed control. The main weed control activity currently is helicopter spraying of 2,4-D on Canada thistle.

Eurasian watermilfoil (*Myriophyllum spicatum*) is a rooted, submersed aquatic macrophyte native to Europe, Africa, and Asia. An aquatic weed first found in Banks Lake in 1977, it has no natural enemies in North America and often outcompetes native plants, forming dense mats which may cause problems in swimming, boating, fishing, navigation, and power generation. When detached and transported by waves or currents to shorelines, it decays and causes appearance and odor problems.

A 1980 BOR survey found it widespread wherever there was suitable substrate for rooting. In some areas it became the dominant aquatic species, and a few plants were found at 18-20 feet of water. A number of milfoil control measures and management techniques involving water level manipulation, mechanical control, herbicides, biological controls, and light-screening measures have been reviewed and considered by BOR. One or some combination of these may be the most effective, although complete eradication does not appear to be practical. “Control” measures should avoid action detrimental to desirable submergent, aquatic plants.

Description of Alternatives

Information on the proposed Banks Lake 10-foot drawndown alternatives was obtained from BOR staff in the Ephrata, WA office. Currently, the BOR has two alternatives to address the goals and objectives agreed to for the Banks Lake drawdown. In addition, the “No Action” Alternative (Alternative A) includes the actions and developments likely to occur in the absence of adopting and implementing a drawdown for Banks Lake. Many of these actions are either required to meet existing BOR or federal law, policy, or regulations; state or local regulations; or are authorized by existing management plans or state policies in effect at Banks Lake. These actions are common to all of the alternatives. A sampling of some of these actions include:

Banks Lake is affected by two Reasonable and Prudent Alternatives (RPA) from the 2000 FCRPS Biological Opinion (BO) issued by the National Marine Fisheries Service (NMFS). These are RPA 23 which requires the operation of Banks Lake up to 5 feet below full (from elevation 1570 feet to 1565 feet) during the month of August and RPA 31 which requires a study to determine the effects of operating Banks Lake up to 10 feet below full pool during the month of August. All operations and RPAs have a goal of increased flows in the Columbia River to assist in the outmigration of salmonids.

<u>No-Action Alternative</u> (Alternative A):

- Banks Lake can be operated for multiple uses throughout the top five feet (1570 feet to 1565 feet) of its operating range in August. For the purposes of Columbia River flow augmentation, it is most likely that it would start at or near full pool on August 1 and draft to elevation 1560 feet per one of the following strategies (Appendix B):

- Early draft – pumping ceases on August 1 and irrigation demand drafts Banks Lake to elevation 1565 feet in about 10 days (most likely when McNary flow targets are not being met in early August.

- Late draft – pumping ceases on August 20 and irrigation demand drafts Banks Lake to elevation 1565 feet by August 31 (most likely when McNary flow targets are being exceeded in early August)

- Uniform draft – pumping is scheduled to draft Banks uniformly from August 1 to August 31 (most likely in near-average water years).

<u>Action Alternative</u> (Alternative B):

- Banks Lake can be operated for multiple uses throughout the top 10 feet (1570 feet to 1560 feet) of its operating range in August. For the purposes of Columbia River flow augmentation, it is most likely that it would start at or near full on August 1 and draft to elevation 1565 feet per one of the following strategies (Appendix B):

  - Early draft – pumping ceases on August 1 and irrigation demand drafts Banks Lake to elevation 1560 feet in about 18 days (most likely when McNary flow targets are not being met in early August).

  - Late draft – pumping ceases on or about August 12 and irrigation demand drafts Banks Lake to elevation 1560 feet by August 31 (most likely when McNary flow targets are being exceeded in early August).

  - Uniform draft – pumping is scheduled to draft Banks uniformly from August 1 to August 31 (most likely in near-average water years).

It is anticipated that refill of Banks Lake to elevation 1565 could happen over the Labor Day holiday for each alternative which would vary from one to seven days after August 31. Refill would take several days and water not pumped during the holiday would be slowly replaced with a target of refilling to 1565 ft. by October 1.

All alternatives and accompanying drafting configurations are described this way to allow the maximum of freedom for the operators to provide water to the river when it is most needed to support the goals of NMFS. Also, predicting the exact operating schedule for Banks Lake is impossible as each year will have a unique set of conditions that will help to dictate the operations for that year.

Fish and Wildlife Resources without the Proposed Ten-Foot Drawdown

In this section, we discuss proposed changes to fish and wildlife and their habitats in a one year period (time-frame the drawdown/flow augmentation would cover) if the proposed 10-foot drawdown was not to take place, that is, following the "No-Action" Alternative A. As noted above, there would be several proposed changes to current management of the Banks Lake area through the current Banks Lake Resource Management Plan (Banks Lake RMP) even without the implementation of a 10-foot drawdown. For example, fish and wildlife habitats would be enhanced, dispersed camping in environmentally sensitive areas would be controlled or eliminated, grazing would be monitored and modified accordingly, the informal shooting range would be closed and a new recreation area would be developed just south of Steamboat Rock. These future actions would result in improved habitat conditions and reduced disturbance to some species in Banks Lake, but secondary effects to species (i.e. salmonids) within the mainstem Columbia River would not be as beneficial without the 10-foot drawdown.

Fisheries-

It appears that fishery habitat for many species should continue to improve over time at Banks Lake. Many of the actions included under the "No-Action" Alternative (Alternative A) could actually improve present conditions for fish. For example, one of the actions would be to enhance fish and wildlife habitats within the immediate Banks Lake ecosystem. This would partially be satisfied by a proposed long-term fishery enhancement project that is currently being proposed by the Washington State Bass Federation. It would result in construction of deepwater reefs and shoreline restoration projects such as using vegetation, rock and/or small wood. Providing additional habitat would benefit several fish species. Additional management changes (such as adjustments to grazing plans) and enhancements (such as reducing recreation impacts in sensitive areas) which are related more directly to wildlife and wildlife habitats, could provide indirect benefits to fishery resources. These enhancements are all subject to available people and money.

However, supplemental flows to aid the migration of juvenile salmonids in the mainstem Columbia River would not be available if the "No-Action" Alternative A was selected. This augmentation to Columbia River flows would contribute to seasonal releases of water from upstream dams which aid in the outmigration process. Salmon evolved under spring flooding conditions which helped carry young fish to the sea. Storage dams hold back water, for flood control and other uses, interrupting the seasonal peaks in the hydrograph. Some studies indicate that travel time of juvenile salmon increases significantly in the Snake River as water flows decrease, and that survival increases as flows increase. Until recently, water levels in the Columbia River have not been determined by needs of the endangered salmonids, but by demand for power, irrigation, water, and flood control.

As mentioned previously, Eurasian watermilfoil control in Banks has involved an infrequent 25-foot drawdown of the lake during winter. Large drawdowns cause adverse impacts to fish habitat in shallow shoreline areas and on the fish populations which depend on this habitat for food and cover. Continuing to use these severe drawdowns every 10 years or so could cause periodic adverse impacts to some fish populations. If other control measures are used, such as spot herbicides or less severe drawdowns, adverse impacts to fishery resources could be less severe. These impacts would not materialize if a "No-Action" Alternative A was selected.

In recent years, personal watercraft (PWC) use has increased significantly and will likely continue to increase at Banks Lake. PWC use in shallow areas during the spawning season potentially reduces the spawning success of nesting fish, therefore, increased use of PWCs in the future would likely continue to impact some fish spawning.

Wildlife-

In the future, it is anticipate that recreational use at Banks Lake would continue to increase if Alternative A was the chosen alternative. This would likely cause at least minor adverse impacts to wildlife and their habitats, depending on how the use is monitored and regulated. Currently, there is dispersed recreation and indiscriminate motorized travel within close proximity of the study area. Depending on the time of year and the habitat impacted, this could have significant adverse impacts to wildlife. For example, dispersed camping at some of the Russian-olive thickets could seriously disturb nesting birds and use of the trees as thermal cover for deer. In the winter, this camping could disturb bald eagles and prevent them from using favored perch sites (i.e. Steamboat Rock nesting site). Off-road vehicle (ORV) use and indiscriminate motorized travel has caused habitat fragmentation throughout and allowed weeds to gain an advantage, especially in shrub-steppe and grassland areas. Also, it has promoted erosion in some areas.

Grazing impacts have occurred throughout the study area from both permitted and trespass grazing. Impacts are primarily from over-grazing and trampling of vegetation and compaction of soils. Aside from direct loss of habitat, this allows weeds to proliferate. Impacts are particularly noticeable in riparian areas, at seeps and springs, and in some shrub-steppe areas. The persistence of grazing impacts and other management-related impacts to wildlife and scarcity of wildlife habitat improvement projects at Banks Lake is at least partially because a management plan for the Banks Lake unit had not yet been finalized by WDFW until recent years through the Banks Lake RMP. Since a plan has been completed, benefits to wildlife could be significant.

Impacts to wildlife and their habitats could occur in the future from various developments. For example, there are proposals to increase developed recreation facilities, including two new campgrounds just south of Steamboat Rock. Unfortunately, campgrounds in these areas would impact some high quality shrub-steppe (along with associated species) and could also impact several cliff-dwelling species (for example, prairie falcons, golden eagles, and several sensitive bat species). However, if developed facilities are placed in areas with low to fair habitat quality and are not near sensitive areas, they could have very low potential impacts to wildlife or their habitats along the fringes of Banks Lake.

Various management actions could be implemented under the proposed Banks Lake RMP if the "No-Action" Alternative A is selected and these would include enhancing fish and wildlife habitat; emphasizing weed control efforts in areas with high wildlife habitat value; controlling dispersed camping, indiscriminate ORV use, and motorized road travel in environmentally sensitive areas; and monitoring grazing and modifying permits and plans accordingly. Plans for improving signage and interpretive opportunities as well as enhancing "Watchable Wildlife" viewing opportunities could improve wildlife and their habitats by helping the public to better appreciate their value. Also, helping them understand current regulations better could reduce actions which degrade habitats or disturb wildlife. Finally, opportunities to generate additional revenue for reservoir area operation, maintenance, and management will be sought in the future. This would be a real benefit since it appears that WDFW has relatively few funds that are dedicated to improving and enhancing wildlife habitat at Banks Lake.

Future of Resources with the Proposed 10-foot Drawdown

Within the "Action" Alternative B, there are several drafting strategies or configurations for the proposed drawdown. All of these strategies focus on one common objective, flow augmentation in the Columbia River. Therefore, this CAR does not address the potential adverse or beneficial impacts from each strategy (i.e. early draft, late draft, etc.) included in the "Action" Alternative B. Instead, it focuses on potential impacts of the action as a whole, with discussions on specific issues and actions of concern.

As mentioned earlier, the future with "No Action" Alternative A (future without a drawdown) could result in select net benefits to fish and wildlife resources above current conditions. All of the management actions that would coincide with Alternative A would be implemented under the current Banks Lake RMP with only slight variations. Where these actions are not included within a particular Banks Lake RMP recommendation, an action is usually proposed that is even more protective of fish and wildlife resources. For example, where "No Action" Alternative A includes a strategy to monitor grazing and modify permits and plans through the Banks Lake RMP, "Action"Alternatives B would include suggested, but not required, mitigative recommendations/measures that would enhance fishery resources within the immediate Banks Lake project area. In addition, there are some actions that are not addressed in the "No-Action" Alternative A which would be implemented with each of the Banks Lake RMP recommendations thereby creating additional benefits to fish and wildlife resources.

Fisheries-

The fisheries ecosystem of Banks and Columbia River would be affected in several ways under the drawdown "Action" Alternative B. First of all, the Washington Department of Fish and Wildlife operates a series of fish net-pens along the north and south shores along Banks Lake (pers. comm. Korth 2001). A drawdown, as proposed in the "Action" Alternative B, would be render this operation useless due to low water levels in Banks Lake. If a drawdown was approved and implemented according to the "Action" Alternative B, the operation of these pens could potentially be delayed during the timeframe of operation which is typically from October to June due to the resulting lowered lake level.

Secondly, ideal rearing habitat for respective fish species would be vastly reduced in the event of a 10-foot drawdown. Osborn Bay of Banks Lake would be one specific area of concern where access to spawning habitat would be a limiting factor. The vegetative structure and shallow-water habitat that rearing fish need for foraging and predator protection would also be reduced. Typically, a minimal forage base exists when fish species are forced to migrate from shoreline habitat and productive littoral zones to the interior of the reservoir where the abundance of forage resources and protective habitats are vastly lower (Korth, pers. comm. 2001). If a drawdown was to be enacted, a corresponding increase in the level of predation on fish species would be a primary effect of the drawdown.

Among the desired effects of the drawdown is control of Eurasion water milfoil. When milfoil occurs in large amounts, it results in degradation of the abundance and diversity of invertebrates needed for fish species due to reduced dissolved-oxygen levels from decaying vegetation. Along with milfoil, it is expected that several other species of aquatic vegetation will die back. These species include *Potomageton pectinatus, P. nodosus, P. crispus, Elodea canadensis, Ceratophyllum demersum, Lemna minor, Typha spp., and Scriipus spp.* Past experience with drawdowns show that all vegetation is somewhat suceptable to damage from exposure, but the native species appear to recover more rapidly than the introduced species (Banks Lake Resource Management Plan, March 2001). This allows the natives to reestablish themselves before the milfoil which increases the competition against milfoil for several years. This also increases the species diversity which should increase the diversity of other species dependent on the plants for food and shelter over the long term. Establishment of these native submergent, aquatic plant species is critical considering various wildlife species (i.e. waterfowl) at Banks Lake rely on this food resource.

As stated above, Columbia River flows and ESA listed salmonid stocks (i.e. sping and summer out-migration) would be positively influenced if the “Action” Alternative B was the preferred alternative.

Wildlife-

Current wildlife management actions proposed under the Banks Lake RMP involve seasonally or permanently closing some roads and dispersed camping in some sensitive areas. Additional actions involve discouraging use of nesting islands and other sensitive areas either seasonally or permanently and modifying the bald eagle management plan. Many of the management actions being considered could provide some benefit to wildlife, primarily through reducing human disturbance factors at critical times of the year for some species. It is predicted that wildlife impacts along the fringe habitat of Banks Lake would be reduced because of lowered recreational use if “Action” Alternative B is selected. There would be some reduction in the habitat degradation that occurs with dispersed camping and other recreation activities. However, habitat degradation could extend to the localized small mammal populations (i.e. beaver and muskrat) as well as bat populations that rely on wetland habitat and invertebrate prey species which originate along the riparian fringe of Banks Lake. The proposed drawdown would significantly reduce this type of habitat and associated food resources.

More specific wildlife concerns resulting from the 10-foot drawdown would predominantly focus around migratory and nesting pairs of bald eagles at Banks Lake. Migratory eagles rely heavily on the migratory and resident waterfowl populations at Banks Lake as a food resource whereas nesting pairs tend to utilize the resident fish species in Banks as the main component of their diets. The proposed drawdown has the potential to limit food resources for nesting pairs, however, bald eagle young of the year would be approaching the fledgling state by the time the drawdown would take effect, thereby limiting significant or obvious impacts to natural reproduction of these eagles. However, human use (i.e. wildlife observation) could increase with the advent of easier access to view nesting sites around the riparian habitat of Banks Lake (i.e. Steamboat Rock nesting site).

Recreation-

Each of the proposed alternatives include actions which would reduce access to frequently-used boat ramps along Banks Lake thereby reducing revenue input into the local economy. One of these popular sites where boating accessibility is important to the local community is Coulee Playland State Park. Moorage around the lake at specified sites would also be affected due to the drafting strategies proposed for this drawdown. This type of local economic impact was evident during the summer of 2001 when Banks Lake was lowered five feet for irrigation purposes as well as Columbia River flow augmentation.

Land Use and Administration-

The main adverse impacts from actions under Land Use and Administration (via the current Banks Lake RMP) would be from disposing or leasing of project lands to private entities. With these proposals, current wildlife habitat could potentially be eliminated on those parcels (120 acres). The magnitude of the impact would depend on the current habitat present, some of which includes wetlands. While 360 acres is proposed to be transferred to BLM, this property would likely be managed the same or similar to current conditions.

Recommendations

- Some mitigation actions for various adverse impacts (existing and potential future impacts) could include the establishment of native riparian vegetation in various areas of the drawdown zone, such as native bunchgrasses and forbs in shrub-steppe and riparian vegetation along the shorelines. The limited timeframe of this drawdown may limit the logistical feasibility of this mitigation.

.

- The BOR should designate a minimum operating level for Banks that allows for feasible operation of net-pen operations at the north and south ends of Banks Lake.

- Funding should be provided for improvement of existing net pens, including structures to eliminate depredation by birds if "Action" Alternative B is selected.

- If the 10-foot drawdown is implemented, the BOR should ensure timely refill of Banks Lake up to 1565 feet by early September to ensure operation of net-pens.

- If 10-foot drawdown is extended into the early spring season of 2003, the BOR shall ensure that both net-pen operations at the north and south ends of Banks Lake will be moved to an ideal operation location before September of the implementation year.

- The BOR shall work collaboratively with WDFW and the Service to develop studies that would examine the effects or lack of effects of the proposed drawdown on rearing fish species in Banks Lake.

- The Service recommends the BOR to develop a short-term plan that would address potential modifications of current boat ramp and moorage facilities in order to facilitate summer use activities.

- The high value of the Devils Punch Bowl area to several migratory bird species and the close proximity of a significant amount of recreation pressure undoubtedly leads to adverse impacts to sensitive habitats and disturbance to these species. Actions should be included, for the "No Action" and "Action" alternatives, that provide some level of protection to species using this area, at least during nesting and rearing seasons.

- The BOR should ensure that a complement of riparian vegetation be maintained along the Banks Lake drawdown zone and that conditions should be sufficient to provide for short-term input of nutrients into the water column as Banks Lake approaches its refill goal.

- A study to determine the reproductive success of western grebes in the study area should be initiated to help determine the level of management that should be applied to protect these birds in light of the proposed drawdown.

- Surveys for pygmy rabbits should be done in specific areas within shrub-steppe communities to address the potential of increased public use that has been diverted away from Banks Lake due to the drawdown.

- Restrictions on the use of PWC during fish spawning seasons in certain areas could benefit several fish species where spawning habitat has become limited due to the proposed drawdown.

- Hatchery compensation via the WDFW is an option that the BOR should pursue if lack of recruitment for certain fish populations is linked to the proposed drawdown.

- Impacts of the several fishing tournaments at Banks Lake on fisheries should be determined and tournaments modified or curtailed, if necessary to facilitate spawning events.

- Protection of habitat, such as shrub-steppe, from fire is important, in this arid region since it does not recover quickly from fire. Attempts should be made to ensure shoreline access to water resources in the event of uncontrolled wildfire in these designated shrub-steppe areas.

- Additional Ute ladies'-tresses surveys should be conducted at the two perennial streams which enter Banks Lake from the northwest and some of the springs and seeps within the immediate vicinity to determine potential impacts to this plant from the proposed drawdown.

- Updating the GIS work that was done at Banks Lake by the BOR would be valuable. Aside from changes that will occur over time, this would allow some of the errors the Service identified in its 1998 Planning Aid Memorandum (U.S. Fish and Wildlife Service 1998) to be corrected and a more accurate vegetation map to be generated to determine potential wetland impacts linked to the drawdown and concurrent management actions.

- The BOR should use all available techniques to eliminate water milfoil if proposed drawdown is implemented. Do not use control methods that would result in negative impacts to desirable submergent, aquatic plants and aquatic invertebrates.

- The BOR should initiate studies to examine the potential effects of the drawdown on wildlife species.

Literature Cited

Andelman, S.J., and A. Stock. 1994. Management, research and monitoring priorities for the conservation of neotropical migratory landbirds that breed in Washington State. Washington Natural Heritage Program. Washington Department of Natural Resources, Olympia, WA. 25 pp.

Anthony, R.G. and F.B. Isaacs. 1989. Characteristics of bald eagle nest sites in Oregon. Journal of Wildlife Management. 53:148-159.

Banks Lake Resource Management Plan, March 2001, Grant County, WA.

Beschta, R.L., R.E. Bilby, G.W. Brown, L.B. Holtby, and T.D. Hofstra. 1987. Stream temperature and aquatic habitat: fisheries and forestry implications. In: Salo, E.O. and T.W. Cundy, editors. Streamside management: Forestry and fisheries interactions. Contribution Number 57. Institute of Forest Resources, University of Washington, Seattle, Washington.

BioAnalysts, Inc. 2002. Movement of bull trout within the Mid-Columbia river and tributaries, 2001-2002. Prepared for the Public Utility District No. 1 of Chelan County, Wenatchee, Washington.

Bonar, S.A. 1997. Status of Burbot in Washington State. Washington Department of Fish and Wildlife. Olympia, WA. 52p.

Brown, L.G. 1992a. Draft management guide for the bull trout *Salvelinus confluentus* (Suckley) on the Wenatchee National Forest. Washington Department of Fish and Wildlife, Olympia Washington.

Brown, L.G. 1994. On the zoogeography and life history of Washington's char. Report 94-04. Washington Department of Fish and Wildlife, Olympia, Washington.

Cassidy, K.M., M.R. Smith, C.E. Grue, K.M. Dvornich, J.E. Cassady, K.R. McAllister, and R.E. Johnson. 1997. Gap Analysis of Washington State: An evaluation of the protection of biodiversity. Volume 5 *in* Washington State Gap Analysis - Final Report (K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, eds.). Washington Cooperative Fish and Wildlife Research Unit, University of Washington. Seattle, 192 pp.

Daubenmire, R. 1988. Steppe vegetation of Washington. Washington State University Cooperative Extension. EB1446. Pullman, WA. 131 pp.

Dobler, F.C., J. Eby, C. Perry, S. Richardson, and M. Vander Haegen. 1996. Status of Washington's shrub-steppe ecosystem: extent, ownership, and wildlife/vegetation relationships. Washington Department Fish and Wildlife, Olympia, WA. 39 pp.

Duff, R.L. 1973. 1971-72 Banks Lake Creek Census. Washington Department of Game, Region #2 (unpubl.).

Fielder, P.C. 1992. Effects of recreational use on bald eagles along the Rock Island Project. PUD Annual Report. Wenatchee, WA. 17 pp.

Foster, J. 1998. Personal communication, Washington Department of Fish and Wildlife. Region #2.

Foster, J. 2001. Personal communication, Washington Department of Fish and Wildlife. Region #2.

Franklin, J.F., and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. USDA Forest Service, Gen. Tech. Report PNW-8. Portland, OR. 417 pp.

Hays, D.W., M.J. Tirhi, and D.W. Stinson. 1998a. Washington State status report for the sharp-tailed grouse. Washington Department Fish and Wildlife. Olympia, WA. 57 pp.

_____. 1998b. Washington State status report for the sage grouse. Washington Department Fish and Wildlife, Olympia, WA. 62 pp.

Johnson, R.E., and K.M. Cassidy. 1997. Terrestrial mammals of Washington State: Location data and predicted distributions. Volume 3 *in* Washington State Gap Analysis-Final Report (K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, eds.). Washington Cooperative Fish and Wildlife Research Unit. University of Washington. Seattle, WA. 304 pp.

Korth, J. 2001. Personal communication, Washington Department of Fish and Wildlife. Region #2.

Mongillo, P.E. 1993. The distribution and status of bull trout/Dolly Varden in Washington State, June 1992. Washington Department of Fish and Wildlife, Fisheries Management Division, Olympia, Washington.

Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: Stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16(2):4-21.

Nelson, A. 1954. Washington Department of Game (unpubl.).

Pratt, K.L. 1992. A review of bull trout life history. In: Howell, P.J. and D.V. Buchanan, editors 1992. Proceedings of Gearhart Mountain Bull Trout Workshop, Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Smith, M.R., P.W. Mattocks, Jr., and K.M. Cassidy. 1997. Breeding birds of Washington State. Volume 4 *in* Washington State Gap Analysis - Final Report (K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, eds.). Seattle Audubon Society. Publication in Zoology No. 1, Seattle, WA. 538 pp.

Spence, M. 1965. Summary of 1965 Banks Lake Fishing Pressure and Catch Estimate Survey. Unpublished. Washington Department of Game. Region #2 (unpubl.).

Stalmaster, M.V. 1987. The bald eagle. Universe Books, New York, NY. 227 pp.

Swenson, J.E., T.C. Hinz, S.J. Knapp, H.J. Wentland and J.T. Herbert. 1981. A survey of bald eagles in southeastern Montana. Raptor Research. 15(4):113-120.

Stober, Q.J., R.W. Tyler, G.L. Thomas, L. Jensen, J.A. Knutzen, D.L. Smith, and R.E. Nakatani 1976. Operation Effects of Irrigation and Pumped Storage on the Ecology of Banks Lake, Washington. Third Ann. Prog. Rep., June 1, 1976-May 31, 1976. FRI-UW-7610, Aug. 1976. FRI, Univ. of Washington. 313 pp.

Stober, Q. J., R. W. Tyler, C. E. Petrosky, K. R. Johnson, C. F. Cowman, Jr., J. Wilcock, and R. E. Nakatani. 1979. Development and evaluation of a net barrier to reduce entrainment loss of kokanee from Banks Lake. Fisheries Research Institute, University of Washington, Seattle, WA. 246 pp.

Thomas, G.L. 1978. The Comparative Responses of Kokanee, Lake Whitefish, and Yellow Perch to Hydrological Perturbations in Banks Lake, Grant County, Eastern Washington. PhD Dissertation, Univ. of Washington, Seattle. 160 pp.

Tabor, J. 2001. Personal communication. Washington Department of Fish and Wildlife. Region #2.

U.S. Soil Conservation Service. 1984. Soil survey of Grant County, Washington. U.S. Department of Agriculture Soil Conservation Service. Spokane, WA. 329 pp.

U.S. Fish and Wildlife Service (USFWS). 1990. Regional wetlands concept plan. U.S. Department of Interior, Fish and Wildlife Service. Portland, OR. 18 pp.

_____. 1998 Endangered and threatened wildlife and plants; Determination of threatened status for the Klamath River and Columbia River distinct population segments of bull trout. Final Rule. Federal Register 63, No. 111(June 10, 1998): 31647.

_____. 1998. Planning Aid Memorandum for the Banks Lake Resource Management Plan. U.S. Department of Interior, Fish and Wildlife Service. Moses Lake and Spokane, WA 56 pp.

_____. 1999. Planning Aid Memorandum for the Banks Lake Resource Management Plan. U.S. Department of Interior, Fish and Wildlife Service. Moses Lake and Spokane, WA 8 pp.

Washington Department of Fish and Wildlife (WDFW). 1991. Bald Eagle Nest Territory Management Plan Steamboat Rock, Grant County.

______ 1995. Washington State recovery plan for the pygmy rabbit. Wildlife Management Program, Washington Department Fish and Wildlife, Olympia, WA. 73 pp.

______ 1996a. Priority habitats and species list, habitat program. Final report. Washington Department Fish and Wildlife, Olympia, WA. 28 pp.

______ 1996b. Banks Lake Kokanee Monitoring in Region #2 Annual Report. Washington Department of Game, Region #2.

______ 1997. Banks Lake Kokanee Monitoring in Region #2 Annual Report. Washington Department of Game, Region #2.

______ 2002a. Species of concern in Washington State. Available at: http://www.wa.gov/wdfw/diversity/soc//soc.htm.

Washington Natural Heritage Program (WNHP). 1981. An illustrated guide to the endangered, threatened and sensitive vascular plants of Washington. Washington Natural Heritage Program, Department of Natural Resources. Olympia, WA.

_____. 1997. Revised listing of endangered, threatened, and sensitive plants and selected rare animals. Washington Natural Heritage Program, Department of Natural Resources, Olympia, WA.

Wolcott, E. E. 1964. The lakes of Washington: Vol. II, Eastern Washington. State of Washington, Division of Water Resources. Water Supply Bulletin 14. Olympia, WA. 650 pp.

Zook, W.J. 1979. Summary of Bass Fishing Contest Results 1978. Washington Department of Game, Region #2 (unpubl.).

Appendix A

Comment Letter from Washington Department of Fish and Wildlife

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 Street SE • Olympia, WA

March 25, 2003

Mark G. Miller
U.S. Fish and Wildlife Office
Central Washington Field Office
215 Melody Lane, Suite 119
Wenatchee, Washington 98801

SUBJECT: Comments on Coordination Act Report for Banks Lake Drawdown

Dear Mr. Miller:

The following are comments by the Washington Department of Fish and Wildlife (WDFW) on the U.S. Fish and Wildlife (USFWS) Coordination Act Report (CAR) for the proposed drawdown of Banks Lake. The purpose of the drawdown is to augment flows in the Columbia River to assist the outmigration of Endangered Species Act (ESA) listed salmon and steelhead by meeting flow objectives identified in the NOAA-Fisheries 2000 Biological Opinion for the Federal Columbia River Power System.

Background

While the CAR covers many important aspects of the proposed drawdown, the underlying assumption seems to be that the Banks Lake Resource Management Plan (RMP) will be implemented and that action will mitigate for or otherwise enhance the fish and wildlife resources. The RMP is an in-depth document, covering many venues and meant as a guide for actions through the foreseeable future. Most actions have no definitive timetable attached and would be implemented as time and resources allow. It would be a mistake to assume that implementation of the RMP would be so timely as to provide an appropriate balance to the impacts of the currently proposed drawdown.

The CAR recommends that the U.S. Bureau of Reclamation (BOR) participate in several studies that would help determine the actual impacts of such a drawdown. These studies could be construed as the same as those described in the RMP. WDFW agrees with the CAR recommendations that the BOR implement appropriate actions in the RMP as a means of blunting the impacts of the drawdown.

An excellent opportunity currently exists for the BOR to participate in the type of studies recommended in the RMP. The WDFW currently receives BPA funding to study certain aspects of kokanee population dynamics in Banks Lake. Since manpower and equipment are already available to some extent, it would be cost effective to expand this project to survey drawdown impacts, complete a more expansive habitat mapping effort, or any number of other endeavors deemed important and economical by the lead agencies.

Specific Comments on the USFWS CAR.

P. 4, pp 2 -- "...it is anticipated that the drawdowns will not impact water quality in the reservoir." Changes in water temperature and retention times, with resultant impacts to reservoir productivity, should be expected but were not adequately addressed. The USFWS proposes that the use of very cold water will be increased during refill. Shallower, water-warming areas will be drained. Nutrient inflow will cease during drawdown. Stratification may be more defined as flow declines during the drawdown, and surface water withdrawal may have a greater impact on productivity. Unless these and other resultant changes have been understood, adverse effects to water quality should be expected.

P.5, pp 5-7 -- In 2001, there was an active bald eagle nest on the south end of the Steamboat Rock (SBR). This nest was successful in producing young. In 2001, there were three active bald eagle nests at Banks Lake. The nest at Osborn Bay was lost in 2001 (it likely was blown out by high wind). It was active (adults present at the nest site) in May 2001 but the nest and adults were gone in June 2001. The nest tree at the south end of SBR is potentially in jeopardy because it could be cut down by beaver. The greatest threat for this site, however, is likely human disturbance. The major threat to bald eagle nesting at Banks Lake is loss or reduction of food resources (i.e., waterfowl and fish).

P.6, pp 3 -- Canada geese and mallards also nest on these and other islands in the lake. More importantly, lowering the surface elevation 10 feet could create land bridges to some islands used by nesting birds. Terrestrial predators could gain access to and become established on these islands.

P.8, pp 1-- There is no discussion on Washington ground squirrels, bats, or other species of mammals. Beaver and muskrat are obvious mammals at Banks Lake and depend on water and wetland habitat.

P.12, pp 5 – "Species of Concern" should be defined. There are several additional species of concern to WDFW. Some of the species are common/abundant and are "important" because they are game or watchable wildlife species.

P.15, para.1--A very important wildlife habitat is shallow water area that contains submergent, aquatic plants and macro invertebrates.

P.16, para.5--Muskrats, beaver, mink, and raccoon also occur in wetland/riparian habitat at Banks Lake.

P 16 -- "Wetland / Riparian areas" are also very important to most species of fish in the reservoir, either as spawning sites or rearing grounds, and certainly as a contributor to the productivity of the reservoir.

P.17, pp.2--Timing and magnitude of drawdown could have major impact on submergent, aquatic plants and aquatic invertebrates.

P 21 -- A reservoir refill to 1565 ft by October 1 is barely adequate to enable the deployment of the net pen rearing facilities at Coulee and Electric Cities. Since the BOR operates the level in the top 2-3 feet for power generation, 1565 means as low as 1562 feet. Drafting 1570 feet by October 1, with the resultant power generation minimum elevation of 1567, would result in a significantly reduced adverse effect to existing net pen operations.

P 21-23 -- As discussed above, the "No-Action" Alternative A assumes benefits to fish and wildlife in large part because implementation of the RMP is assumed. The RMP and its implementation are long-term plans that stand-alone from the proposed drawdown.

P 23-24 -- The CAR assumes those early, late or gradual drawdowns are immaterial to drawdown impacts because the primary objective in the Columbia River is the same. However, drawdown timing would very likely create different impacts to the reservoir, and present a reasonable case for monitoring.

P.24, pp4--Are we sure that native species of submergent, aquatic plants will benefit from the drawdown? This is a crucial question. Some native submergent, aquatic plants are of major importance to wildlife at Banks Lake.

Comments on the CAR Recommendations:

The WDFW finds the CAR recommendations generally adequate. We have the following comments specific to the recommendations:

P.25, #4 -- Refill to 1570 by October 1 would be more desirable.

P.25, #6 -- Studies implemented should include not only rearing, but all aspects of fish.

If you have further questions or comments please contact Mr. Shane Scott at (360) 902-2812.

Sincerely,

B. Shane Scott

Shane Scott
Columbia River Policy
Intergovernmental Resource Management

SS:dr

cc: Bill Tweit, WDFW, Jeff Korth, WDFW, Jim Blanchard, U.S. Bureau of Reclamation

Appendix B

Drafting Configurations for “Action” and “No-Action” Alternatives

Action Alternative: The action alternative can be accomplished in a number of configurations. Four configurations were modeled. This reflects RPA Action No.31.

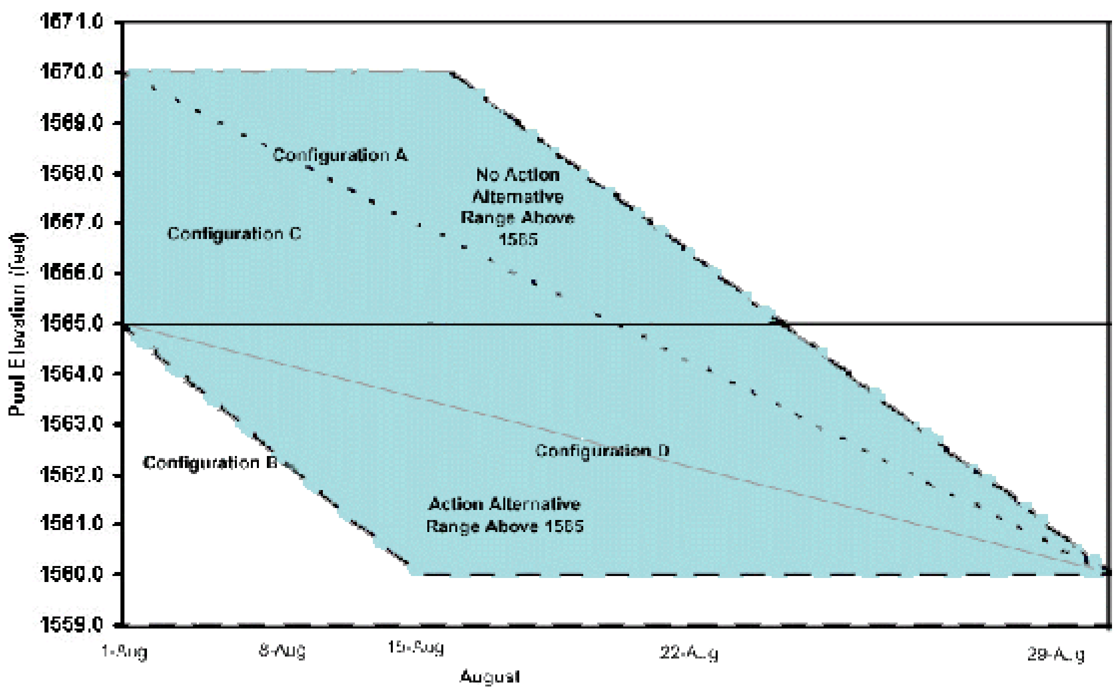
A. Assume that beginning August 1, the pool elevation is at 1570 feet and is drafted evenly through August to elevation 1560 feet. This is equivalent to 260,800 acre-feet at a rate of 4,252 cfs.

B. Assume that beginning August 1, the pool elevation is at 1565 and is drafted evenly through the first half of August. This is equivalent to 127,200 acre-feet at a rate of 2,275 cfs.

C. Assume that beginning August 1, the pool is at elevation 1570 cfs and is drafted at the scheduled pumping rates to elevation 1560. This is equivalent to 260,800 acre-feet at the scheduled pumping rate of 7,923 cfs for August 1-15 and 6,750 cfs for August 16-31. This is equivalent to stopping the pumping operations on August 1st and allowing Banks Lake to draft to the target elevation and then begin pumping to maintain elevation 1560 through the end of August. It will take approximately 17 to 20 days to draw Banks Lake down at the expected average irrigation demand.

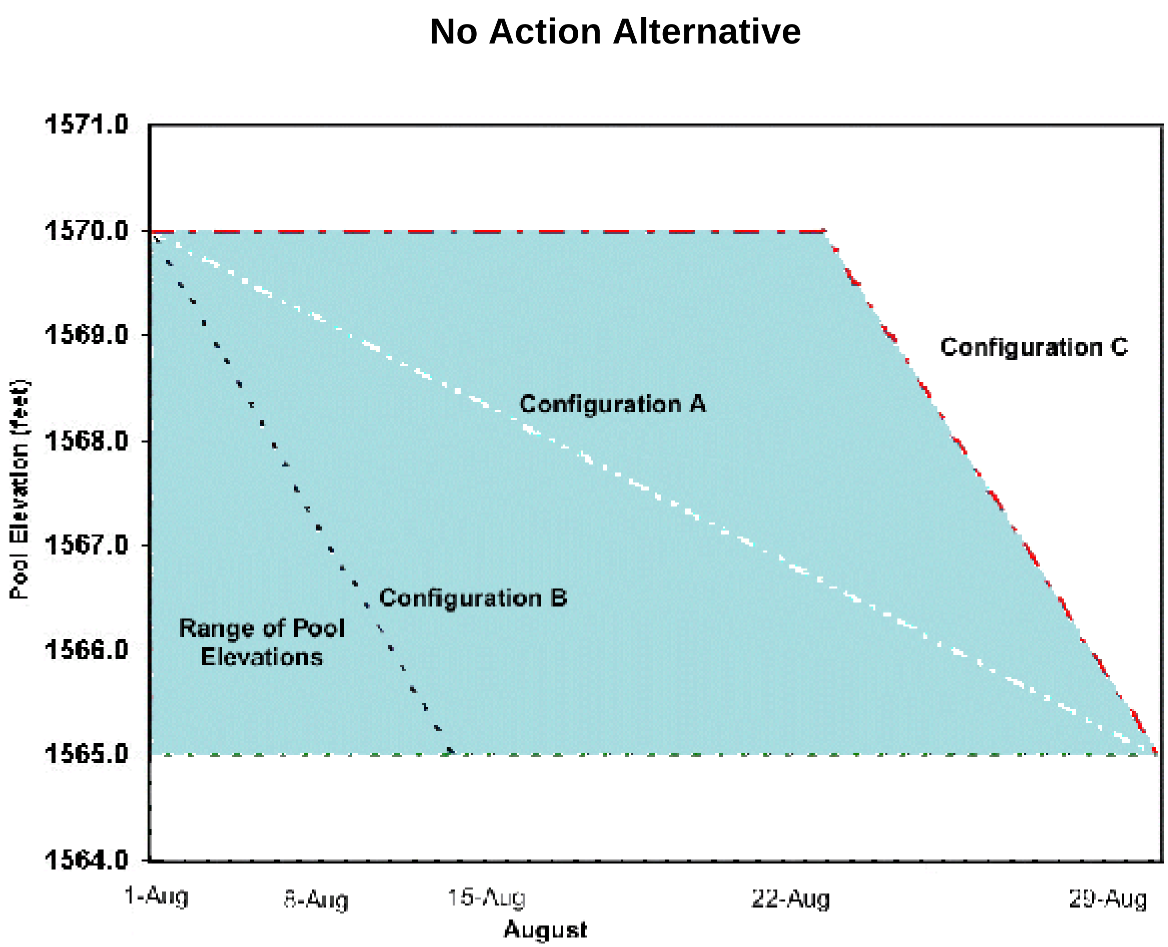
D. Assume that beginning August 1, the pool elevation is at 1565 and is drafted evenly through August. This is equivalent to 127,200 acre-feet at a rate of 2,069 cfs.

Action Alternative



No Action Alternative. (5 feet of Draft At Banks Lake.) Assumes that beginning August 1, the pool elevation is at 1570 feet. The volume of water between elevation 1570 feet and 1565 feet is equivalent to 133,600 acre-feet. The model results show the volume drafted using 3 configurations.

A. Draft Banks Lake evenly through August to elevation 1565 feet. This is equivalent to a flow rate of 2,173 cfs.
B. Draft Banks Lake evenly August 1-15 to elevation 1565 feet. This is equivalent to a flow rate of 4,490 cfs.
C. Draft Banks Lake evenly August 16-31 to elevation 1565 feet. This is equivalent to a flow rate of 4,209 cfs.



Appendix B

Scoping Summary Report

Scoping Summary

Banks Lake Drawdown
Environmental Impact Statement
Columbia Basin Project, Washington

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Ephrata Field Office
Ephrata, Washington

November 2001

Scoping Summary

Banks Lake Drawdown
Environmental Impact Statement
Columbia Basin Project, Washington

Banks Lake is operated as a re-regulation reservoir for the Columbia Basin Project (CBP). The reservoir is approximately 27 miles long and contains slightly more than 1 million acre feet of water at full pool. The water supply for the reservoir is stored behind Grand Coulee Dam and is lifted from Franklin Delano Roosevelt Reservoir into Banks Lake. Water is delivered into the Main Canal at Dry Falls Dam on the southern end of Banks Lake and from there delivered to approximately 670,000 acres. This is just over one-half of the authorized lands for the CBP. Reclamation currently operates the reservoir in the top 5 feet of the pool between elevations 1565 and 1570.

Action 31 of the Federal Columbia River Power System (FCRPS) Biological Opinion (BO) issued by the National Marine Fisheries Service (NMFS) on December 21, 2000, calls for the assessment of operation of Banks Lake at up to 10 feet below full pool beginning in August of each year to enhance flows in the Columbia River during the juvenile outmigration of salmonid stocks listed under the Endangered Species Act. An annual lowering in August to elevation 1560 (10 feet below full pool) would constitute a change in how Banks Lake has been operated over the last 20 years. After August 31, refill would continue as currently allowed under existing authority.

The purpose of this project is to enhance the probability of meeting target flows in the Columbia River at McNary Dam during the juvenile outmigration of Endangered Species Act listed salmonid stocks by altering the August drawdown of Banks Lake from elevation 1565 down to elevation 1560, in compliance with Action No. 31 of the Reasonable and Prudent Alternative of the Federal Columbia River Power System Biological Opinion, issued by the National Marine Fisheries Service on December 21, 2000.

A Notice of Intent to prepare an Environmental Impact Statement on altering existing operations at Banks Lake to provide for an annual drawdown of up to 10 feet from full pool and an announcement of public scoping meetings appeared in the *Federal Register* on April 25, 2001. A meeting notice describing the project, requesting comments, providing a return postage paid envelope, and announcing the date, time, and location of the public scoping meeting was mailed to over 300 potentially interested individuals, groups, and governmental agencies. A press release announcing the public meetings was sent to area media. Copies of the Notice of Intent and meeting notice are attached to this document.

Reclamation held a scoping meeting Tuesday May 15, 2001, in Coulee City, Washington. Reclamation presented background information and described preliminary alternatives being considered for the drawdown of Banks Lake and provided opportunities to ask questions, identify issues and concerns associated with the preliminary alternatives or identify other alternatives for the drawdown. About 55 people attended the meeting. Oral comments were recorded on flip charts. Comment sheets and postage-paid return envelopes were provided. In addition to comments received at the meetings, 34 comment letters were received in time to be included in this comment summary document.

The nature of the comments ranged from brief comments or questions to detailed statements. This document summarizes comments received to date. Some comments concern actions or issues that are outside the scope of this Environmental Impact Statement (EIS) and are listed at the end of this summary. The remaining comments will be considered by the EIS technical team and used as appropriate in the preparation of the Draft EIS. Additional issues may arise which will be considered and included for analysis as appropriate.

COMMENTS WITHIN THE SCOPE OF THIS EIS

Impacts of Previous Drawdowns

- Banks Lake
  - The perch and crappie fishery suffered and is just now recovering
  - The muskrat population was almost starved to nothing
  - The exposed milfoil was not burned
- Coulee City
  - No water in swimming area
  - Boat launch unusable
  - Took 5 years to recover the loss of revenue from the Community Park alone with just a 1-year drawdown
- Sunbanks Resort
  - Shoreline (over 4,000 ft) was all mud and clay
  - Unable to launch boats at marina
  - Significantly reduced business at peak times
- Public perception
  - Unable to launch boats on Banks Lake
  - Unable to use recreation facilities
- Local area
  - Detrimental effects on recreation in August
  - Tourists/visitors did not come to the area; businesses and communities lost revenue

NEPA Process

- Describe the context of this project and how it fits in with other existing and proposed actions of Reclamation and other agencies in the Columbia River Basin including:
  - The impetus behind writing of the 2000 BO
  - A list of action items in the 2000 BO Reclamation is responsible for
  - An explanation of Reclamation's and NMFS's NEPA compliance responsibilities for action items in the 2000 BO and an indication if NMFS is a cooperating agency
  - A statement differentiating the recently completed Resource Management Plan and the contents of the proposed EIS for the drawdown
  - A description of the scope of the EIS detailing whether the EIS would encompass all aspects of operating the reservoir or whether it would be limited to those aspects affected by the drawdown. The rationale behind the scope.
  - A description of the level of discretion Reclamation has in responding to the 2000 BO
- Define the issues.
- Include the full range of reasonable alternatives including those not within the jurisdiction of Reclamation. The number of alternatives should be based on the number necessary to fully disclose different levels of environmental impacts to affected resources.
- Include appropriate mitigation measures.
- Provide a clear basis for choice among the alternatives.
- Include a discussion of the reasons why other alternatives were eliminated.
- Request by Grant County Board of Commissioners to participate as a cooperating agency
- Ensure the effects of the decision are fully and adequately considered on the physical environment, customs, culture, and tax base of the local area.

- Consider the relationship of the proposed action to state/local plans, laws, etc.
- Will the drawdowns continue for the length of the BO or until delisting/ extinction?
- Will there be opportunities for mid-course reviews and adjustments?
- How will we find out if there actually is a benefit to the fish from the drawdown?
- Consider relationship of this action to BiOp Action Item 14 (cooler water supplementation)
- Public meetings should be publicized at least 2 weeks in advance of being held.
- Who will make the final decision on whether to draw down Banks Lake and this EIS?
- A 1-year study is not adequate to determine the biological effects, e.g., warm water fish recruitment
- Is a local formally organized group needed/more effective in this process?
- What is the involvement of Tacoma/Seattle City Light in this study?
- How many years has flow augmentation been going on?

Preliminary Alternatives

- Salmon in the Columbia River wouldn't benefit from the small additional flow afforded by drawing down Banks Lake.
- Strong general opposition to drawdowns, especially in August
- Will the 10-ft drawdown occur when flows in the Columbia are above normal?
- Suspicion of even deeper drawdowns being required in the future. Suspicion of NMFS intentions
- The Banks Lake Drawdown is a Super Super idea. Very exciting!
- If this drawdown was in addition to some other beneficial effort, i.e., Eurasian milfoil eradication, needed lake infrastructure repair, etc., then this drawdown would be a lot more palatable.
- I would not be opposed to the drawdown if it does not effect spawning or cut down on living area of the warm water fish stocks.

Suggested Additional Alternatives

- From full pool, a 5-ft drawdown of Banks Lake in August; don't refill until the following spring.
- The Bureau should operate in a range that never goes below 1560. This would result in an operating range for drawdown of between 1560 and 1562 feet elevation.

Consultation

- Hold formal consultation with affected tribal leaders and officials that is distinctly separate from the NEPA scoping process to ensure Reclamation fully complies with Executive Order 13084 (Consultation and Coordination with Indian Tribal Governments).

Infrastructure

- Identify effects on lakebed power lines, including potential for damage and deterioration.
- Identify effects of wave action on the stability of roadway foundations where they abut the lake.

Soils

- Identify changes in elevation of wind and wave erosion on sedimentation and erosion rates.

Water

- Summarize the purpose and content of the Memorandum of Agreement and Understanding between Reclamation, EPA, and the Washington State Department of Ecology concerning water quality.
- Identify users of water diverted from Banks Lake during the period of drawdown, impacts to them, and potential mitigation measures, e.g., conservation techniques (changing irrigation methods) to help alleviate water shortages felt by irrigators.
- Describe the quantity of water and how it works its way through the Columbia Basin Project.
- Identify the impacts to water temperature in Banks Lake and the Columbia River.
- How long does it take for Banks Lake to go down 5/10 ft in August? How long to refill after the 5-/10-ft drawdown?
- Identify the impacts of several years of drought on the drawdown/refill schedule.
- What is the percent of water from the drawdown to the total flow of the Columbia?
- Identify impacts to groundwater wells in the area.
- Determine whether the drawdown would cause a shift in the hydrologic regime (both surface and groundwater).
- Consider the likely refill schedules for a 5- and a 10-ft drawdown.
- Provide the drawdown schedule and amounts (in feet below high water).

Power

- Identify impacts to power generation and storage.
- Evaluate and quantify the changes in hydropower production at both Grand Coulee and Main Canal Headworks as a result of the 5- and 10-ft drawdown.
- Will the drawdown increase demand for alternative power generation units, e.g., diesel powered generators?
- Explain how changes in generation affect Northwest ratepayers.
- Quantify the additional power BPA will receive from the extra flow.

Operation and Maintenance

- Analyze the effects on pumping and pump-generating activities at Grand Coulee for the 5- and 10-ft drawdowns.
    - Will the number of starts and stops increase or decrease?
    - Will operation and maintenance costs to irrigation and/or hydropower increase or decrease? Who pays?
- How far down does the water level in Banks Lake have to be for maintenance? How often?

Vegetation

- Identify potential for changes in noxious weed invasions.
- If the 10-ft drawdown causes a shift in the hydrologic regime (surface and groundwater), identify the effect on the emergent and scrub-shrub wetlands at Banks Lake and Sun Lakes State Park.
- Identify short and long term impacts to riparian revegetation projects.

Fish

- Identify the effects on the fishery.
- Identify effects on the estuary at Northrup Creek.
- Identify effects to the fry.
- Identify losses of fish through conduits, entrainment.
- Identify water temperature impacts to fish in the lake and in the Columbia River.
- Identify areas of and impacts to stranded fish, e.g., Osborn Bay.

- Identify impacts to native fish, especially the channel catfish in the Osborn Bay area.
- Identify impacts of exposure of prime spiny ray habitat on forage fish and the walleye fishery.
- There's no fish ladder at Chief Joseph or Grand Coulee, so how's this going to help the salmon?
- For the first time in many years, silver fishing in Banks Lake is again present.
- Identify fishery impacts at other lakes affected by the drawdown of Banks Lake
- Identify impacts to the fish pens and their fish, including the spiny ray.

Wildlife
- Identify impacts to amphibians.
- Identify effects on the roosting colony of bats near the mouth of Northrup Canyon.
- Identify effects on the estuary at Northrup Creek.
- Quantify and evaluate the consumptive and nonconsumptive effects to wildlife.
- Banks Lake also provides a lot of habitat that indirectly substitutes where it has been lost elsewhere due to various land use practices.
- Identify effects on shoreline-using species from loss of cover and food.

Threatened & Endangered Species
- Identify impacts to all listed plant and wildlife species associated with changes in shoreline riparian and wetland areas.

Cultural Resources
- Identify impacts including potential for looting and loss of site integrity.

Health & Safety
- Identify boating hazards created by drawdown.
- Identify increases in fire hazards from loss of vegetation.

Recreation
- Identify and analyze impacts to all Banks Lake recreation facilities.
- August is the peak of the recreation season.
- Would the "bathtub-ring" effect caused by the drawdown cause recreationists to relocate to other, more scenic areas?
- There will be a loss of good public relations with the recreating public who use Banks Lake extensively.
- The Coulee City boat basin is only 12 ft deep; a 2-ft depth will leave a weed-choked waterway, usable by only very small craft.
- The 5-ft drawdowns of previous years have already had a detrimental effect on recreation in August.
- Identify recreation impacts at other lakes affected by the drawdown of Banks Lake.

Irrigation
- Suspicion that Banks Lake drawdowns could hurt farmers. Identify the potential impacts to the Columbia Basin Project irrigation operations.
- Including the probabilities of, responses to and likely results of catastrophes at Grand Coulee, such as last summer's fire and prolonged pump outage, for both a 5- and a 10-ft drawdown.

Economics
- Analyze impacts to local economy.
- Identify changes to BPA revenues.

- Much of the local tourism comes from the west side of the state.
- Income is lost because of the public perception that the lakes are dry or unusable.
- Local businesses are promoting Banks Lake as a recreation/vacation destination.
- An adverse impact on attendance at State Park facilities would negatively impact generated revenues, reducing funds available to operate these facilities.
- Quantify the benefits to listed species in the Columbia River resulting from both a 5- and a 10-ft drawdown.
- Quantify and evaluate changes to hydropower generation, facilities, and utilities.
- Identify the impacts to power rate payers
- Identify the economic impacts on homeowners, farmers, and the health of the community.
- Identify the economic impacts of the loss of fishery due to overfishing at other lakes affected by the Banks Lake drawdown
- Timing of the drawdown will determine economic impacts to the local area and the time and rate of recovery.
- Identify and quantify the changes in O&M costs and charges.

Social Values

- People are more important than salmon. Too many resources have been spent on salmon in the Northwest, sometimes ineffectively.
- I'm just a fisherman and former trapper and I hate to see you screw the Lake again.
- While I can foresee that the 10-ft drawdown may cause temporary problems for critters living in and around the lake—including people—saving endangered salmon runs is the No. 1 priority.
- We enjoy Banks Lake because of the many water-related recreational activities provided. Over the years our vacation gatherings at Banks Lake have provided thousands of hours of priceless, high-quality family time spanning three generations. A drawdown of 10 ft will adversely affect these activities, or eliminate them completely. The 5-ft drawdowns of previous years have already had a detrimental effect on the recreation at Banks Lake in August. Any further degradation caused by a greater drawdown is unacceptable.
- Killing fish on one lake to save fish elsewhere doesn't make sense.
- For no more water than this will supply at McNary Dam, I believe the negative impact on our community will be deplorable.

Mitigation

- How will local businesses and communities be compensated for any financial losses resulting from the drawdown?
- Identify mitigation for fish and wildlife losses related to dewatering of shoreline and wetland habitats.
- Grants will be needed to deepen boat basins and extend boat ramps.
- Creation of deep water habitat enhancement at Potholes Reservoir to offset overfishing by Banks Lake angler substitution.

COMMENTS OUTSIDE THE SCOPE OF THIS EIS

The purpose of this project is to enhance the probability of meeting target flows in the Columbia River at McNary Dam during the juvenile outmigration of Endangered Species Act listed salmonid stocks by altering the August drawdown of Banks Lake from elevation 1565 down to elevation 1560, to comply with Action No. 31 of the Reasonable and Prudent Alternative of the Federal Columbia River Power System Biological Opinion, issued by the National Marine Fisheries Service on December 21, 2000.

Some comments fall outside the scope of this EIS, because they do not address the purpose of this project. Others fall outside the scope, because other actions address them.

Here is a summary of comments outside the scope of this EIS:

Comments That Do Not Address the Purpose of this Project

- Tap the Project water at Pasco and return it to the river
- Stop all fishing for salmon for 20 years
- If salmon is endangered, it is by the harvesting being done in the ocean, the fishing in the river, the seals and terns
- As far as I'm aware, more damage is being done downstream (e.g., arctic tern). I really have read very little about water enhancement being a great boon to endangered fish species.
- The local economy has already suffered from the effects of drawing down Lake Roosevelt; effects that have not been published to our knowledge

Comments That Other Actions Address

- Draw Lake Roosevelt down a foot rather than draw Banks Lake down an additional five feet
- Provide the demonstrated scientific basis for the need for additional water for Columbia River fish
- Provide the demonstrated scientific basis for the need for additional water for Columbia River fish

Miscellaneous

- Surprised the drawdown will not occur in 2001 because of the shortage of snowpack and forecasted low flow
- Does NMFS have a monitoring program for supplementation water?
- A need for additional Columbia River flows has not been demonstrated scientifically
- Disclose water quality impacts including temperature impacts to the Columbia River from releasing reservoir water back into it. (*Note: This project does not propose to release water from Banks Lake into the Columbia River; instead, it proposes to increase Columbia River flows by pumping less water into Banks Lake from the Columbia River.*)
- How long does it take for water to get from FDR Lake to McNary Dam?
- Identify changes in lake levels at Potholes Reservoir, Moses Lake, etc., because of the drawdown
- Will diesel-powered generators using Banks Lake water be affected by the 10-ft drawdown?
- It doesn't make sense to decrease water levels on Banks to support salmon downstream on the Columbia.
- We ought to stop all fishing for salmon for a while. This is the only endangered species with a two-a-day limit.

- As we have seen from the Klamath Basin situation, water rights mean nothing to NMFS. What is 5 feet this year becomes something more the next year.
- The Town of Coulee City requests reimbursement of $35,000 per year for lost revenue for each year Banks Lake is drawn down
- Provide an annual proactive, in-advance public information program to let people statewide know even though the lake is down, recreation opportunities are still available
- Other freshwater lakes could be stocked a little heavier to mitigate for loss of fish in Banks Lake

Notice of Intent

2. Prescribed Fire Use: The use of prescribed fire is currently an area of public concern due to recent publicity over escaped burns in Los Alamos and California. The Elko District could benefit from prescribed fire use in high fuel load areas to reduce the potential impacts from severe wildland fire and to improve habitat. Local residents need to be involved with all prescribed fire planning and support any proposed prescribed fire projects.

3. Conversion of Sagebrush Habitat: Wildlife managers throughout the Great Basin are concerned over the precipitous decline in sage grouse numbers in recent years, thus causing an increased demand for the protection of sagebrush habitat throughout Elko District. Wildfire can both improve and devastate sage grouse habitat. Managing this habitat in view of competing resource uses and the spread of invasive, nonnative weeds throughout the district is a challenge for local land managers.

4. Emergency Fire Rehabilitation (EFR): Some EFR procedures are controversial, including fencing recently burned and/or rehabilitated areas to prevent grazing on fragile re-vegetation, as well as seeding with non-native grass species which out-compete noxious weeds and cheatgrass. Fencing burned areas in wild horse Herd Management Areas can disrupt movement of wild horses and are not popular with wild horse advocacy groups. Livestock owners are also concerned about the economic impacts of some EFR projects on their livelihood.

5. Forest Resources: Declining forest resources throughout the district put remaining stands at risk. Some stands need fire to insure forest ecosystem health. However, extensive fuels buildup could cause high intensity fires, leading to stand replacement as well as firefighter safety issues. In addition, Native Americans have concerns over the health of pinyon pine tree stands, since the tree and its fruit are important in maintaining their traditions.

6. Invasive, Nonnative Weeds: The significant resources required to fight noxious weed and cheatgrass invasions requires the cooperation of all landowners in affected areas in the district. Wildfire management is one of the most important factors affecting the spread of these weeds in the Elko District.

7. Fire Suppression Costs and Affect on Local Rural Economies: Although high suppression costs affect all taxpayers, many local rural communities depend heavily on the influx of dollars from fire suppression efforts. Less fire suppression could lead to the saving of tax dollars and the possible improvement of some habitat values, however, several local economies may be negatively impacted by any changes.

8. Community Assistance: Better communication, training, and cooperation with local communities would aid in reducing the threat from wildfire in the wildland urban interface, reduce arson, trespass, and negligence occurrence, and encourage fire prevention.

BLM planning regulations (43 CFR 1610) require preparation of planning criteria to guide development of all resource management plans, revisions, and amendments. Planning criteria are based on: standards prescribed by applicable laws and regulations; agency guidance; the result of consultation and coordination with the public and other Federal, State and local agencies and governmental entities and Native American tribes; analysis of information pertinent to the planning area; and professional judgement. The following preliminary criteria were developed internally and will be reviewed by the public before being used in the amendment/EA process. After analysis of public input, they will become proposed criteria, and can be added to or changed as issues are addressed or new information is presented. The Elko Field Manager will approve all planning criteria, as well as any proposed changes:

—The fire management RMP amendment will be completed in compliance with FLPMA and all other applicable laws and regulations.
—The Elko Field Office Planning Interdisciplinary Team will work cooperatively with the State of Nevada, tribal governments, county and municipal governments, other Federal agencies, and all other interested groups, agencies, and individuals. Public participation will be encouraged throughout the planning process.
—The RMP amendment will establish the fire management guidance upon which the BLM will rely in managing the Elko District, for the life of both the Elko and Wells RMPs.
—The RMP amendment process will include an Environmental Assessment that will comply with all National Environmental Policy Act standards.
—The RMP amendment will emphasize the protection and enhancement of Elko District natural resources, while at the same time providing the public with opportunities for use of these resources.
—The lifestyles and concerns of area residents, including livestock grazing, recreational uses, and other land uses, will be recognized in the amendment.
—Any lands located within the Elko District administrative boundary which are acquired by the BLM, will be managed consistent with the amendment, subject to any constraints associated with the acquisition.
—The amendment will recognize the State's responsibility to manage wildlife.
—The amendment will incorporate the Nevada Rangeland Health Standards and Guidelines and be consistent with the Nevada Sage Grouse Management Guidelines.
—The planning process will involve Native American tribal governments and will provide strategies for the protection of recognized traditional uses.
—Decisions in the amendment will strive to be consistent with the existing plans and policies of adjacent local, State, Tribal and Federal agencies, to the extent consistent with Federal law.

Freedom of Information Act Considerations: Public comments submitted for this planning amendment, including names and street addresses of respondents, will be available for public review and disclosure at the Elko Field Office during regular business hours. Individual respondents may request confidentiality. If you wish to withhold your name or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your comments. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Dated: April 6, 2001.

Helen Hankins,

Elko Field Manager.

[FR Doc. 01–10210 Filed 4–24–01; 8:45am]

BILLING CODE 4310–HC–M

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Banks Lake Drawdown, Columbia Basin Project, Washington

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of intent to prepare an environmental impact statement.

SUMMARY: Pursuant to section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, the Bureau of Reclamation (Reclamation) proposes to prepare an environmental impact statement (EIS) to evaluate impacts of altering existing operations at Banks Lake to provide for an annual drawdown of up to 10 feet from full pool to enhance flows in the Columbia River during the juvenile out migration of salmonid stocks listed under the Endangered Species Act. The proposed drawdown would occur in August and the elevation of the surface water would remain constant from August 31st through December 31st. This action would constitute a change in existing operations, although it is within existing operating authorization. The proposed drawdown is being evaluated in response to Action item 31 of the Federal Columbia River Power System (FCRPS) Biological Opinion issued by the National Marine Fisheries Service on December 21, 2000.

DATES: A scoping meeting to identify issues to be evaluated in the EIS will be held at:

- Coulee City, WA: May 15, 2001, 7 to 9 p.m.

Written comments will be accepted through May 31, 2001 for inclusion in the scoping summary document. Requests for sign language interpretation for the hearing impaired or other auxiliary aids should be submitted to Jim Blanchard as indicated under **ADDRESSES** by May 8, 2001.

ADDRESSES: Comments and requests to be added to the mailing list may be submitted to Bureau of Reclamation, Ephrata Field Office, Attention: James Blanchard, 32 C Street, Box 815, Ephrata, WA 98823.

The scoping meeting will be held at the following location:

- Coulee City Middle School Gym, 312 E. Main Street, Coulee City, WA.

Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

FOR FURTHER INFORMATION CONTACT: James Blanchard, Bureau of Reclamation, telephone: (509) 754–0226, fax: (509) 754–0239. The hearing impaired may contact Mr. Blanchard at the above number via a toll free TTY relay: (800) 833–6388. The meeting facilities are physically accessible to people with disabilities. Please direct requests for sign language interpretation for the hearing impaired, or other special needs, to James Blanchard at the telephone numbers indicated above by May 8, 2001.

SUPPLEMENTARY INFORMATION:

Background

Banks Lake is operated as a re-regulation reservoir for the Columbia Basin Project (CBP). The reservoir is approximately 27 miles long and contains slightly more than one million acre feet of water at full pool. The water supply for the reservoir is stored behind Grand Coulee Dam and is lifted from Franklin Delano Roosevelt Reservoir into Banks Lake. Water is delivered into the Main Canal at Dry Falls Dam on the southern end of Banks Lake and from there delivered to approximately 670,000 acres. This is just over ½ of the authorized lands for the CBP. Although Reclamation is currently authorized to operate the reservoir down to 5 feet below full pool, for the past 5 years it has been operated at close to full pool throughout the year to increase the generating capability of the pump/generators at Grand Coulee. Previous operations were within the top two feet of full pool during irrigation season and then drawing the reservoir level down five feet during the non-irrigation season.

Action 31 of the FCRPS Biological Opinion calls for the assessment of operation of Banks Lake at up to 10 feet below full pool beginning in August of each year. Refill would occur from January through April. The reduction of pumping into Banks Lake will increase the amount of water available to support endangered salmonid stocks in the Columbia River.

Public Involvement

Reclamation is requesting public comment to help identify the significant issues and reasonable alternatives to be addressed in the EIS. Reclamation will summarize comments received during the scoping meeting and from letters of comment received during the scoping period, identified under **DATES,** into a scoping summary document. This scoping summary will be sent to all who responded during the scoping period, and also will be made available to the public upon request.

Dated: April 19, 2001.

J. Eric Glover,

Acting Regional Director, Pacific Northwest Region.

[FR Doc. 01–10218 Filed 4–24–01; 8:45 am]

BILLING CODE 4310–MN–P

DEPARTMENT OF JUSTICE

Drug Enforcement Administration

Importer of Controlled Substances; Notice of Registration

By notice dated August 18, 2000, and published in the **Federal Register** on September 6, 2000, (65 FR 54071) Salsbury Chemicals, Inc., 1205 11th Street, Charles City, Iowa 50616–3466, made application to the Drug Enforcement Administration (DEA) to be registered as an importer of phenylacetone (8501), a basic class of controlled substance listed in Schedule II.

The firm plans to import phenylacetone to manufacture amphetamine for distribution to its customers.

No comments or objections have been received. DEA has considered the factors in title 21, United States Code, section 823(a) and determined that the registration of Salsbury Chemicals, Inc. is consistent with the public interest and with United States obligations under international treaties, conventions, or protocols in effect on May 1, 1971, at this time. DEA has investigated Salsbury Chemicals, Inc. to ensure that the company's continued registration is consistent with the public interest. This investigation included inspection and testing of the company's physical security systems, verification of the Company's compliance with state and local laws, and a review of the company's background and history. Therefore, pursuant to section 1008(a) of the Controlled Substances Import and Export Act and in accordance with title 21, Code of Federal Regulations, section 1301.34, the above firm is granted registration as an importer of the basic class of controlled substance listed above.

Dated: April 13, 2001.

Laura M. Nagel,

Deputy Assistant Administrator, Office of Diversion Control, Drug Enforcement Administration.

[FR Doc. 01–10257 Filed 4–24–01; 8:45 am]

BILLING CODE 4410–09–M

Meeting Notice

PUBLIC SCOPING MEETING
ON BANKS LAKE DRAWDOWN

Please come to the Bureau of Reclamation's (Reclamation) scoping meeting to get information about the potential drawdown of Banks Lake in northwest Washington State. Reclamation will present alternatives being considered to draw the lake down up to 10 feet and provide opportunities to identify issues and concerns associated with the proposed alternatives or identify other alternatives for the Banks Lake drawdown. This scoping meeting is ***not*** part of the Banks Lake Resource Management Plan Environmental Assessment.

WHEN AND WHERE

TUESDAY, MAY 15, 2001
COULEE CITY
7:00 - 9:00 p.m.
Coulee City Middle School
Gym
312 East Main Street
Coulee City, Washington
(509) 632-5312

DIRECTIONS:
From State Highway 22, turn south at 4th Street — the Main Entrance to Coulee City. Continue south for five blocks to Main Street (the post office is on the east corner). Turn east on Main Street. Continue east on Main Street for five blocks. Main Street ends at the Coulee City Middle School. Parking is available in front of the main entrance to the school. After entering the building, proceed straight to the gym.

BACKGROUND

Action 31 of the Federal Columbia River Power System (FCRPS) Biological Opinion, issued by the National Marine Fisheries Service on December 21, 2000, calls for the assessment of operation of Banks Lake at up to 10 feet below full pool during August of each year. The reduction of pumping into Banks Lake will increase the amount of water available to support endangered salmonid stocks in the Columbia River.

This action would constitute a change in existing operations, although it is within existing operating authorization. Reclamation is currently authorized to operate the reservoir down to 5 feet below full pool; however, for the past 5 years it has been operated at close to full pool throughout the year to increase the generating capability of the pump/generators at Grand Coulee. Previous operations were within the top 2 feet of full pool during irrigation season, and then the reservoir level was drawn down 5 feet during the nonirrigation season.

BANKS LAKE

Banks Lake is operated as a re-regulation reservoir for the Columbia Basin Project (CBP). The reservoir is approximately 27 miles long and contains slightly more than 1 million acre-feet of water at full pool. The water supply for the reservoir is stored behind Grand Coulee Dam and is lifted from Franklin Delano Roosevelt Reservoir into Banks Lake. Water is delivered into the Main Canal at Dry Falls Dam on the southern end of Banks Lake and from there delivered to approximately 670,000 acres. This is just over one-half of the authorized lands for the CBP.

What Reclamation Is Doing

Reclamation is preparing an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA). The No Action Alternative will be the current operation, which is a 5-foot drawdown in August for fish flows as called for by Action 23 of the December 21, 2001, FCRPS Biological Opinion. Under NEPA, impacts of this alternative must be evaluated and will form the basis for comparison of impacts among the action alternatives. A range of action alternatives to draw the lake down 10 feet during August of each year will be developed. The draft EIS will evaluate impacts of these alternatives compared to the No Action Alternative.

What You Can Do

Attend the Scoping Meeting

We need your interest and input to help address this action. Please come to the public scoping meeting and share your thoughts with us. A scoping summary describing issues identified at the scoping meeting, and in written comments received, will be developed and made available to the public. If you are unable to attend, please send us your written comments on the attached sheet by May 31, 2001.

The meeting facilities are physically accessible to people with disabilities. Please direct requests for sign language interpretation for the hearing impaired, or other special needs, to Jim Blanchard, Bureau of Reclamation at telephone (509) 754-0226, or fax (509) 754-0239. The hearing impaired may contact Mr. Blanchard at the above number via a toll free TTY relay at (800) 833-6388.

Provide Your Comments

If you would like to be on the mailing list, provide a comment, or request a copy of the draft EIS, you can send the attached comment sheet in the enclosed postage-paid envelope.

If we do not hear from you,
we will remove your name from this mailing list.

For Additional Information,
You May Contact:

Jim Blanchard
Special Projects Officer
Bureau of Reclamation
32 C Street, Box 815
Ephrata, WA 98823
telephone: (509) 754-0226
fax: (509) 754-0239

BANKS LAKE DRAWDOWN
COMMENT SHEET AND DRAFT EIS REQUEST FORM

Please provide your comments below and return them in the enclosed postage paid envelope by May 31, 2001, for inclusion in the scoping summary document.

Note: You can request to withhold your name and/or address by stating this prominently at the beginning of your comment. However, we will make all submissions from organizations or businesses, and from representatives or officials of organizations or businesses, available for public disclosure in their entirety.

If you want to be on the mailing list, please **print** your:

Name ____________________

Address ____________________

____

City, State, Zip ____________________

Optional Phone ____________________

Optional Fax ____________________

Optional E-mail ____________________

Do you want to receive a copy of the draft EIS? yes____ no____

What format: cd-rom (with built in reader) ___ paper copy ___ executive summary only ___

Comments:

____

____

____

____

____

____

____

____

Please continue your comments on the back of this sheet and add additional sheets if desired.
Please return sheet(s) in the enclosed postage paid envelope OR you may fax them to:
Jim Blanchard, Special Projects Officer, Bureau of Reclamation, fax: (509) 754-0239.

MN

Comments on Banks Lake Drawdown (continued from front)

Please return sheet(s) in the enclosed postage paid envelope OR you may fax them to:
Jim Blanchard, Special Projects Officer, Bureau of Reclamation at (509) 754-0239.

MN

Appendix C

Hydrologic Report

Banks Lake Flow Augmentation
Hydrologic Study Results
December 22, 2003

Background

The Reasonable and Prudent Alternative (RPA) Action No.31 of the National Marine Fisheries Service December 2000 Federal Columbia River Power System Biological Opinion[1] (FCRPS BiOp) states that Reclamation should perform an evaluation of the effects of drafting Banks Lake to elevation 1560 feet during the month of August. This action is to provide additional water downstream to meet flow objectives in the Columbia River during the out-migration of ESA listed juvenile salmonid stocks.

The current operation of Banks Lake is to restrict pumping from Lake Roosevelt and allow the lake to be drafted to elevation 1565 feet. This measure is described in RPA Action No. 23 of the FCRPS BiOp.

General

This document provides the hydrologic comparison of the current operation and the proposed operation. The current operation allows Banks Lake to be drafted to elevation 1565 feet. The proposed operation would allow Banks Lake to be drafted an additional five feet to elevation 1560 feet. Full Pool at Banks Lake is at elevation 1570 feet. The Lake typically operates during most of the year within 1 foot of elevation 1568 feet.

Banks Lake has a twofold function; providing pumped storage for peaking power operations associated with the Grand Coulee Project and as a re-regulation reservoir for the Columbia Basin Project. The water in Banks Lake must be pumped from Franklin Delano Roosevelt Lake (FDR) behind Grand Coulee Dam through pumps and pump/generators on the west side of the FDR.

The volume of storage above elevation 1565 is 133,600 acre-feet. The volume of storage between the elevations of 1565 feet and 1560 feet is 127,200 acre-feet, which is equivalent to approximately 1.8 feet of depth in FDR Lake (at elevation 1278 feet). The storage/elevation curve for Banks Lake is shown in Figure 1 in this Appendix.

[1] National Marine Fisheries Service – Northwest Region, "Endangered Species Act – Section 7 Consultation, Biological Opinion – Re-initiation of Consultation on Operation of the Federal Columbia River power System including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin" December 21, 2000 pg. 9-71

Hydrologic Modeling

The primary focus of the modeling was to quantify the potential contribution of the volume of the proposed draft of Banks Lake at McNary Dam downstream. Hydro-simulation data, provided by the Bonneville Power Administration, were used to model the alternatives.

The Hydro-simulation model is a semi-monthly model with August and April divided into two periods for a total of fourteen periods. The alternatives presented in the EIS report are based on real-time operations and do not align precisely with the modeled periods. Therefore, modeling the effect of the alternatives on the flows in the Columbia River requires that the daily flow contributions from the alternatives be averaged over the Hydro-Simulation modeling periods.

The modeling periods in August are Aug1 and Aug2. Aug1 is the period August 1 -15. Aug2 is the period August 16 – 31. An example: During the first half of August Banks Lake is drafted 5 feet in 10 days for a real-time daily flow contribution of 6,736 cfs. However, the 10 day "real time" period does not align precisely with the modeled period. Therefore, same volume of draft must be spread over the modeled period of 15 days at a daily flow contribution of 4,490 cfs.

The 2000 BiOp studies include drafting Banks Lake to elevation 1565 feet, so resulting flows at McNary were used as the base flow for this study. The additional flows resulting from the various draft alternatives at Banks Lake are added to the modeled flows at McNary Dam.

The hydro-simulation data is the output from the FCRPS studies that reflect operations in compliance with the 2000 Biological Opinion (BiOp). The hydro-simulation uses the historical hydrologic and meteorologic data sets over the period 1929-1978, current system configuration and operating requirements to compute the flows that would have occurred if the system and its constraints existed in those years.

This analysis focused on increasing the draft of Banks Lake during the month of August. The draft of Banks Lake was modeled by reducing the pumping from FDR Lake and allowing the irrigation demand to draft Banks Lake. Once the target elevation for Banks Lake is met pumping is resumed to hold that elevation through the end of August. Downstream flows are increased by the reduction in pumping rate.

The study is based on the assumption that Banks Lake is full on August 1; therefore the results are conservative. The actual August 1 starting elevation at Banks Lake is typically within 1 foot of 1568.

The flow target at McNary for salmon is 200,000 cfs for the entire month of August. For this simplified analysis, the value of 195,000 cfs is used in lieu of the actual flow objective of 200,000 cfs to compensate for modeling uncertainty. This produces results that more realistically represent the number of years that the flow objective would be met.

No Action Alternative

The No Action alternative drafts Banks Lake a total of five feet. Four different operating scenarios were modeled. This alternative assumes that beginning August 1st the pool elevation is at 1570 feet. The volume of water between elevation 1570 feet and 1565 feet is equivalent to 133,600 acre-feet. The four operating scenarios include:

Low Water – Assumes that Banks Lake was drafted five feet prior to August 1 and held at elevation 1565 feet throughout August.

Uniform Draft - Draft Banks Lake to elevation 1565 feet evenly through August. The modeled equivalent is a daily flow rate of 2,173 cfs over the periods Aug1 and Aug2.

Early Draft - Draft Banks Lake to elevation 1565 feet over 10 days in the first half of August. The modeled equivalent is a daily flow rate of 4,490 cfs over the period Aug1.

Late Draft - Draft Banks Lake to elevation 1565 feet over 10 days in the last half of August to elevation 1565 feet. The modeled equivalent is a daily flow rate of 4,209 cfs over the period Aug2.

Action Alternative

The Action alternative evaluates the impacts of drafting Banks Lake up to 10 feet. Four different operating scenarios were modeled. These scenarios assume different starting elevations on August 1 and different draft rates, but all draft Banks Lake to elevation 1560 feet by the end of the month.

Low Water–Assume that Banks Lake was drafted to pool elevation 1565 prior to August 1, and is then drafted over 10 days to elevation 1560 feet in the first half of August. The modeled equivalent is a daily flow rate of 4,275 cfs over the period Aug1.

Early Draft - Assume that on August 1 the pool elevation is 1570 feet and is drafted to elevation 1560 feet over 20 days in August. The modeled equivalent is a draft of 195,600 acre-feet at a rate of 6,574 cfs from August 1-15 and a draft of 65,200 acre-feet at a daily flow rate of 2,054 cfs over the Aug2 period.

Uniform Draft - Assume that on August 1 the pool elevation is 1570 feet and is drafted evenly to elevation 1560 feet at the end of August. The modeled equivalent is a daily flow rate of 4,242 cfs over the periods Aug1 and Aug2.

Late Draft – Assume the pool would be drafted over the last 20 days of to elevation 1560 feet. The modeled equivalent is a draft of 52,160 acre-feet at a rate of 1,753 cfs from August 1-15 and a draft of 208,640 acre-feet at a daily flow rate of 6,754 cfs over the Aug2 period.

Table 1 Flow Contributions at McNary Dam.

Alternatives as Modeled with The Hydro-Simulation Model Aug1 = August 1-15 = 15 days Aug2 = August 16-31 = 16 days	Potential Flow Contribution at McNary Dam (cfs per day)		Number of Years the Flow at McNary Dam Met or Exceeded 195 kcfs (within 1 kcfs)	
	Aug1	Aug2	Aug1	Aug2
No Action Alternative.				
Low Water – Banks Lake drafted to 1565 prior to August 1 and held at elevation 1565 feet through August	0	0	20	5
Early Draft - 5 feet of Draft at Banks from 1570 to 1565 in Aug1.	4490	0	21	5
Uniform Draft - 5 feet of Draft at Banks from Elevation 1570 to 1565 spread evenly through August.	2173	2173	21	6
Late Draft - 5 feet of Draft at Banks from 1570 to 1565 in Aug2.	0	4209	20	6
Action Alternative.				
Low Water – Banks Lake drafted to 1565 prior to August 1, then 5 feet of draft at Banks from Elevation 1565 to 1560 in Aug1.	4275	0	21	5
Early Draft - Draft 195,600 acre-feet at a rate of 6,574 cfs in Aug1 and a draft of 65,200 acre-feet at a daily flow rate of 2,054 cfs in Aug2.	6754	2054	21	6
Uniform Draft - 10 feet of Draft at Banks from Elevation 1570 to 1560 spread evenly through August.	4242	4242	21	6
Late Draft - Draft 52,160 acre-feet at a rate of 1,753 cfs in Aug1 and a draft of 208,640 acre-feet at a daily flow rate of 6,754 cfs in Aug2.	1753	6754	21	7

Results

A. Effects of the Draft of Banks Lake on Columbia River Flows

Drafting Banks Lake during the month of August will increase streamflow in the Columbia River at McNary. During the month of August Grand Coulee is being drafted to the BiOp summer draft limits of either 1280 feet or 1278. During the month of August the inflows into Grand Coulee are highly regulated. The primary sources of inflow are the headwater projects of Libby Dam and Hungry Horse Dam and releases from storage in Canada. Libby and Hungry Horse are also being drafted during the month of August to their respective summer draft limits. The releases from Canada are controlled by Treaty and Non-Treaty agreements.

Results of the evaluation show that a contribution of five feet of water from Banks Lake makes a small difference to the McNary flows during the August time periods. By drafting an additional five feet of water from Banks Lake, flow targets at McNary Dam can be met one more time in the second half of August. The number of years the flow at McNary Dam met or exceeded 195,000 cfs, within 1 kcfs, with this additional volume is presented in Table 1.

It should be noted that the only time the flows at McNary Dam are close to the BiOp objective in August the water supply in the basin is very high. Therefore, measuring the hydrologic effect of the Banks Lake operation on meeting flow objectives in August is not the best method. The flow augmentation provided from Banks Lake is more significant to the flow in the Columbia River in low runoff years.

B. Effect of Banks Lake Refill

The refill of Banks Lake occurs during periods where smaller loads on the power system are typically experienced. The rate of refill of Banks Lake will be variable and unique each year.

The water removed from FDR to refill Banks Lake is a small increment of the flow in the Columbia River. Labor Day and Thanksgiving Day weekends commonly provide good conditions for pumping into Banks Lake when there is low power demand elsewhere on the system so power costs are low. The refill operations typically avoid periods where flow minimums for fish migration are in effect.

The project has the capability to refill from elevation 1565 to 1570 in less than four days; however, the higher cost of peaking power makes this a less desirable operation. System conditions will dictate the rate of refill.

Irrigation demands on Banks Lake diminish in September and can disappear completely in October. A reasonable assumption for the refill would be no net gain on weekdays and pumping in small increments over each weekend. This will refill Banks Lake gradually while taking advantage of holiday or other periods of smaller system loads. It is also reasonable to assume that the pool will reach 1568 by the end of Thanksgiving weekend.

APPENDIX

Figure 1. Storage/Elevation Curve

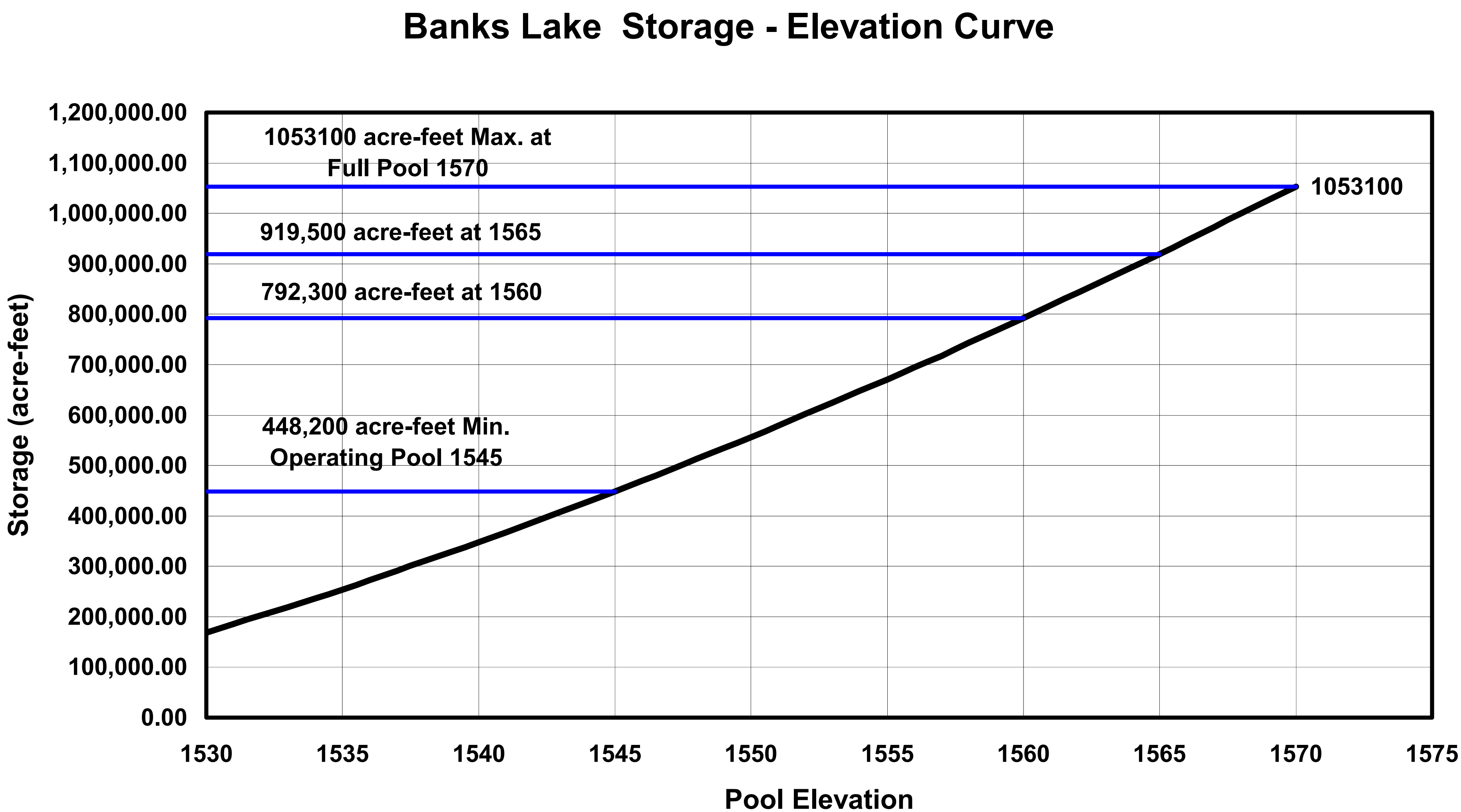


Figure 2. Banks Lake Forebay Exceedance Curve.

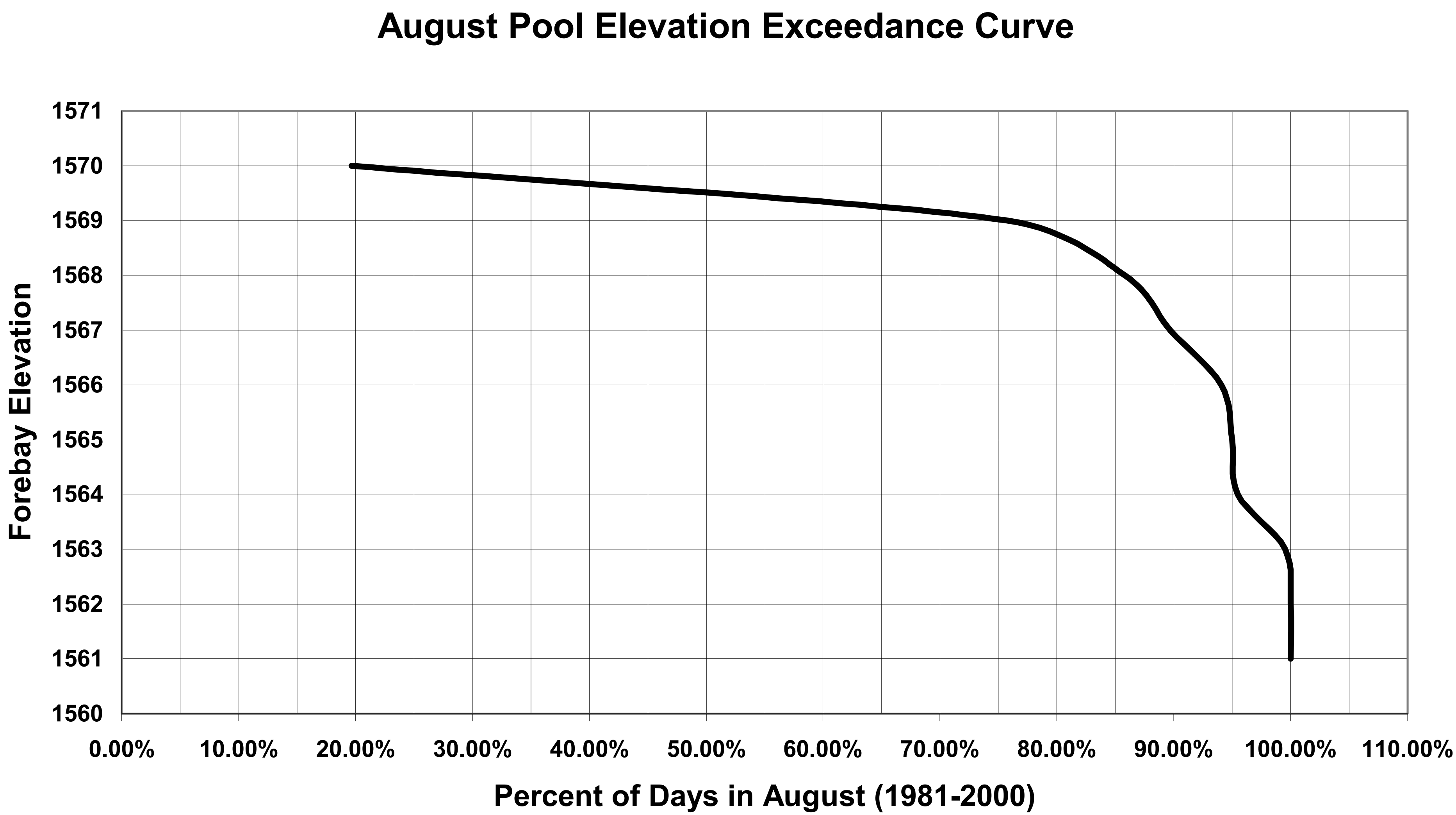


Figure 3. 1980-1989 Historical Banks Lake Pool Elevations.

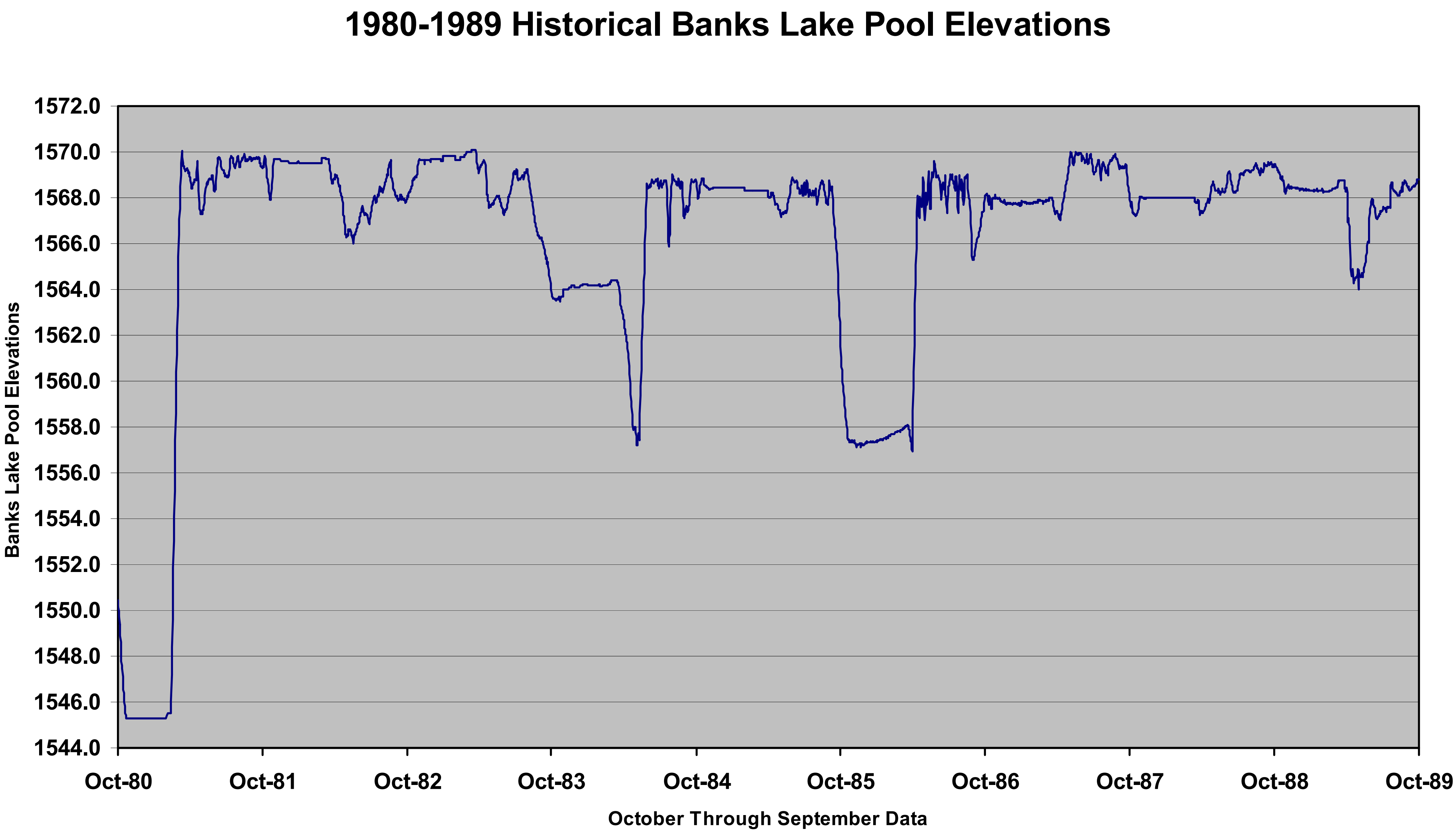


Figure 4. Historical Banks Lake Pool Elevations 1990-1999

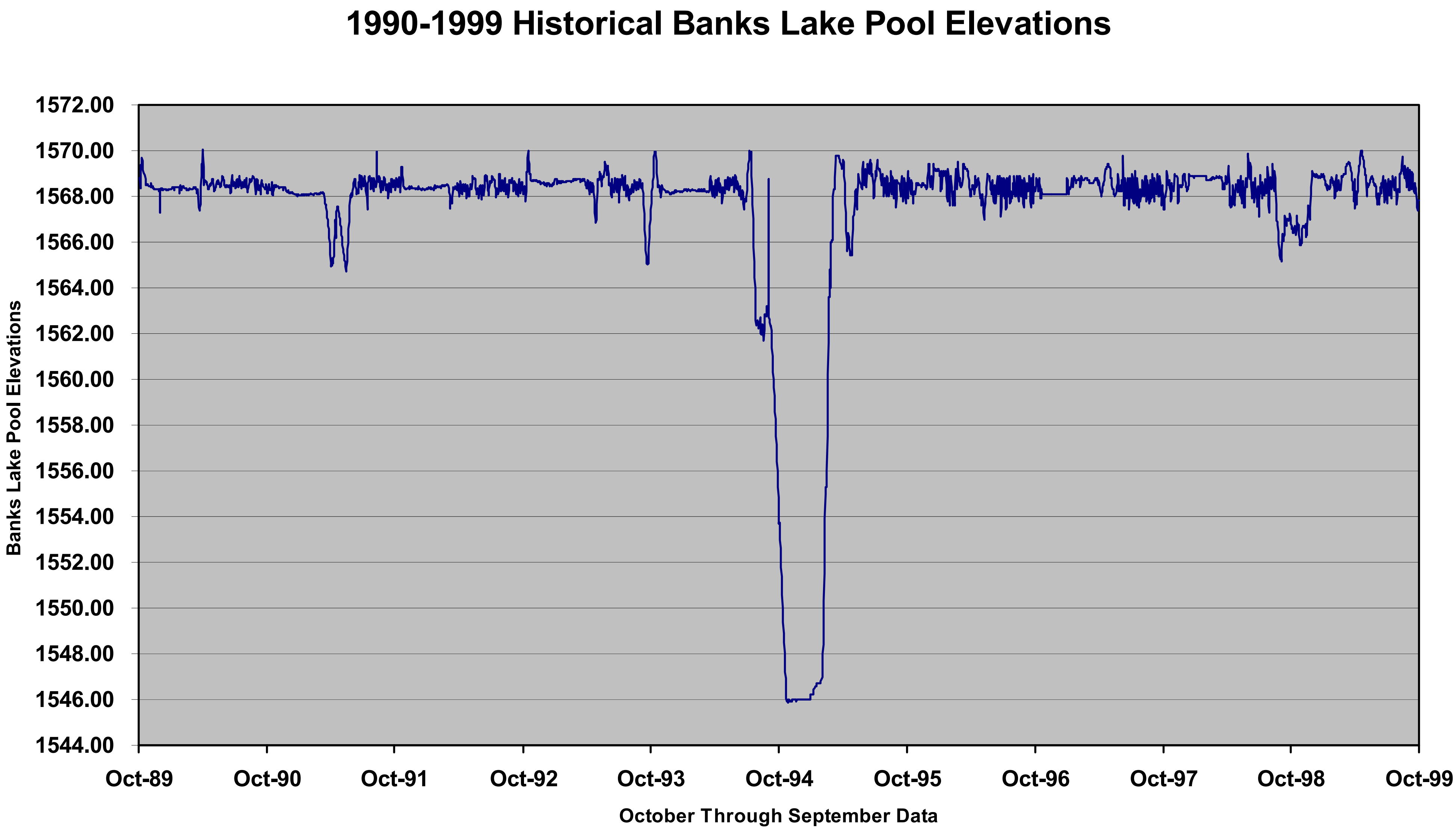


Figure 5. Historical Banks Lake Pool Elevation for Year 2000

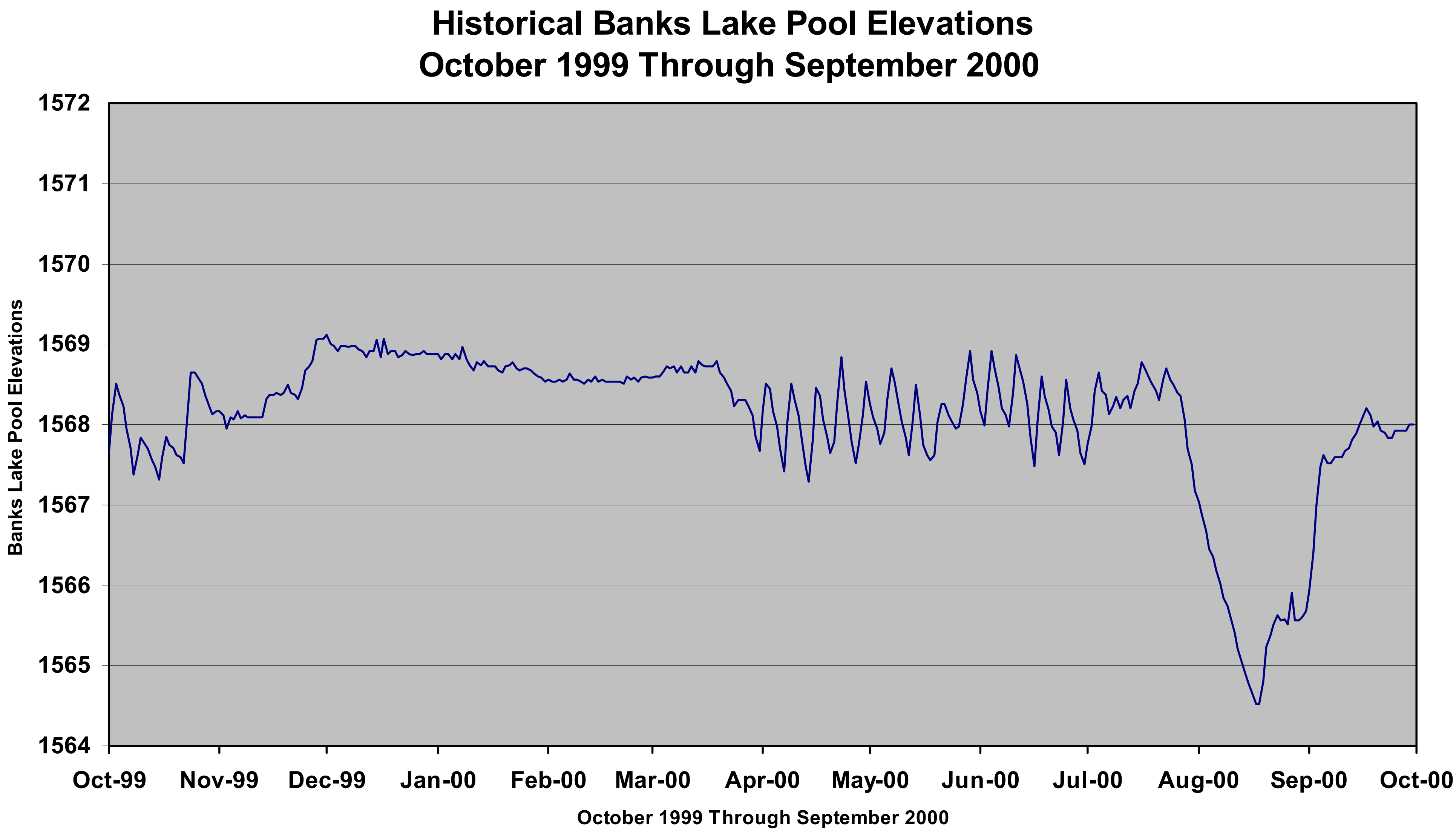


Table 2. Modeled Flow Data (cfs) for Each Scenario of the No-Action Alternative.

		Low Water		Uniform Draft		Early Draft		Late Draft	
Year	Volume (Maf)	August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31
28		179152	126113	181325	128286	183642	126113	179152	130322
29	68.4	126905	117733	129078	119906	131395	117733	126905	121942
30	70.0	137671	105937	139844	108110	142161	105937	137671	110146
31	64.4	146631	115927	148804	118100	151121	115927	146631	120136
32	106.1	170308	158833	172481	161006	174798	158833	170308	163042
33	108.1	197827	197827	200000	200000	202317	197827	197827	202036
34	110.6	130423	106216	132596	108389	134913	106216	130423	110425
35	90.9	195662	132116	197835	134289	200152	132116	195662	136325
36	88.6	166093	123764	168266	125937	170583	123764	166093	127973
37	69.2	152669	108696	154842	110869	157159	108696	152669	112905
38	106.1	158151	125364	160324	127537	162641	125364	158151	129573
39	81.0	145772	124212	147945	126385	150262	124212	145772	128421
40	80.8	141361	110541	143534	112714	145851	110541	141361	114750
41	69.5	149056	120971	151229	123144	153546	120971	149056	125180
42	90.6	163090	143423	165263	145596	167580	143423	163090	147632
43	117.4	195259	160436	197432	162609	199749	160436	195259	164645
44	60.1	124323	99729	126496	101902	128813	99729	124323	103938
45	82.3	142390	135444	144563	137617	146880	135444	142390	139653
46	111.4	195675	146466	197848	148639	200165	146466	195675	150675
47	106.2	178493	136618	180666	138791	182983	136618	178493	140827
48	130.8	197827	193031	200000	195204	202317	193031	197827	197240
49	101.9	136325	102008	138498	104181	140815	102008	136325	106217
50	123.8	197827	190448	200000	192621	202317	190448	197827	194657
51	124.5	197827	169002	200000	171175	202317	169002	197827	173211
52	112.6	183827	136929	186000	139102	188317	136929	183827	141138
53	105.8	194835	158080	197008	160253	199325	158080	194835	162289
54	117.9	226582	197827	228755	200000	231072	197827	226582	202036
55	96.4	197827	177641	200000	179814	202317	177641	197827	181850
56	139.9	196773	163183	198946	165356	201263	163183	196773	167392
57	112.3	158584	119459	160757	121632	163074	119459	158584	123668
58	107.1	154773	130359	156946	132532	159263	130359	154773	134568
59	117.8	197827	157165	200000	159338	202317	157165	197827	161374
60	101.8	197827	123642	200000	125815	202317	123642	197827	127851
61	111.2	158871	135685	161044	137858	163361	135685	158871	139894
62	96.9	179023	143462	181196	145635	183513	143462	179023	147671
63	94.1	184356	150653	186529	152826	188846	150653	184356	154862
64	106.6	197827	167981	200000	170154	202317	167981	197827	172190
65	125.6	197827	166401	200000	168574	202317	166401	197827	170610
66	89.5	186923	131612	189096	133785	191413	131612	186923	135821
67	112.6	197827	156440	200000	158613	202317	156440	197827	160649

68	95.3	197827	162286	200000	164459	202317	162286	197827	166495
69	122.1	157976	123274	160149	125447	162466	123274	157976	127483
70	96.1	151906	127135	154079	129308	156396	127135	151906	131344
71	138.5	200328	183699	202501	185872	204818	183699	200328	187908
72	151.6	214805	197827	216978	200000	219295	197827	214805	202036
73	70.9	128872	99477	131045	101650	133362	99477	128872	103686
74	156.1	203064	197827	205237	200000	207554	197827	203064	202036
75	111.4	159212	146834	161385	149007	163702	146834	159212	151043
76	121.8	242829	227148	245002	229321	247319	227148	242829	231357
77	53.5	138417	108049	140590	110222	142907	108049	138417	112258

Table 3. Modeled Flow Data (cfs) for Each Scenario of the Action Alternative.

		Low Water Early Draft		Uniform Draft		Early Draft		Late Draft	
Year	Volume (Maf)	August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31
28		183427	126113	183394	130355	185906	128167	180905	132867
29	68.4	131180	117733	131147	121975	133659	119787	128658	124487
30	70.0	141946	105937	141913	110179	144425	107991	139424	112691
31	64.4	150906	115927	150873	120169	153385	117981	148384	122681
32	106.1	174583	158833	174550	163075	177062	160887	172061	165587
33	108.1	202102	197827	202069	202069	204581	199881	199580	204581
34	110.6	134698	106216	134665	110458	137177	108270	132176	112970
35	90.9	199937	132116	199904	136358	202416	134170	197415	138870
36	88.6	170368	123764	170335	128006	172847	125818	167846	130518
37	69.2	156944	108696	156911	112938	159423	110750	154422	115450
38	106.1	162426	125364	162393	129606	164905	127418	159904	132118
39	81.0	150047	124212	150014	128454	152526	126266	147525	130966
40	80.8	145636	110541	145603	114783	148115	112595	143114	117295
41	69.5	153331	120971	153298	125213	155810	123025	150809	127725
42	90.6	167365	143423	167332	147665	169844	145477	164843	150177
43	117.4	199534	160436	199501	164678	202013	162490	197012	167190
44	60.1	128598	99729	128565	103971	131077	101783	126076	106483
45	82.3	146665	135444	146632	139686	149144	137498	144143	142198
46	111.4	199950	146466	199917	150708	202429	148520	197428	153220
47	106.2	182768	136618	182735	140860	185247	138672	180246	143372
48	130.8	202102	193031	202069	197273	204581	195085	199580	199785
49	101.9	140600	102008	140567	106250	143079	104062	138078	108762
50	123.8	202102	190448	202069	194690	204581	192502	199580	197202
51	124.5	202102	169002	202069	173244	204581	171056	199580	175756
52	112.6	188102	136929	188069	141171	190581	138983	185580	143683
53	105.8	199110	158080	199077	162322	201589	160134	196588	164834
54	117.9	230857	197827	230824	202069	233336	199881	228335	204581
55	96.4	202102	177641	202069	181883	204581	179695	199580	184395
56	139.9	201048	163183	201015	167425	203527	165237	198526	169937
57	112.3	162859	119459	162826	123701	165338	121513	160337	126213
58	107.1	159048	130359	159015	134601	161527	132413	156526	137113
59	117.8	202102	157165	202069	161407	204581	159219	199580	163919
60	101.8	202102	123642	202069	127884	204581	125696	199580	130396
61	111.2	163146	135685	163113	139927	165625	137739	160624	142439
62	96.9	183298	143462	183265	147704	185777	145516	180776	150216
63	94.1	188631	150653	188598	154895	191110	152707	186109	157407
64	106.6	202102	167981	202069	172223	204581	170035	199580	174735
65	125.6	202102	166401	202069	170643	204581	168455	199580	173155
66	89.5	191198	131612	191165	135854	193677	133666	188676	138366
67	112.6	202102	156440	202069	160682	204581	158494	199580	163194
68	95.3	202102	162286	202069	166528	204581	164340	199580	169040
69	122.1	162251	123274	162218	127516	164730	125328	159729	130028
70	96.1	156181	127135	156148	131377	158660	129189	153659	133889
71	138.5	204603	183699	204570	187941	207082	185753	202081	190453
72	151.6	219080	197827	219047	202069	221559	199881	216558	204581

73	70.9	133147	99477	133114	103719	135626	101531	130625	106231
74	156.1	207339	197827	207306	202069	209818	199881	204817	204581
75	111.4	163487	146834	163454	151076	165966	148888	160965	153588
76	121.8	247104	227148	247071	231390	249583	229202	244582	233902
77	53.5	142692	108049	142659	112291	145171	110103	140170	114803

Table 4. First of Month Banks Lake Pool Elevation (feet) 1980-2000.

Date	Elevation	Date	Elevation	Date	Elevation
10/01/80	1550.5	10/01/87	1568.0	10/01/94	1553.7
11/01/80	1545.3	11/01/87	1568.0	11/01/94	1546.0
12/01/80	1545.3	12/01/87	1568.0	12/01/94	1546.0
01/01/81	1545.3	01/01/88	1568.0	01/01/95	1546.2
02/01/81	1545.4	02/01/88	1568.0	02/01/95	1546.9
03/01/81	1563.3	03/01/88	1568.0	03/01/95	1566.1
04/01/81	1568.9	04/01/88	1567.4	04/01/95	1569.4
05/01/81	1567.3	05/01/88	1568.6	05/01/95	1567.0
06/01/81	1568.3	06/01/88	1568.5	06/01/95	1568.7
07/01/81	1569.0	07/01/88	1568.5	07/01/95	1568.3
08/01/81	1569.8	08/01/88	1569.1	08/01/95	1568.5
09/01/81	1569.7	09/01/88	1569.1	09/01/95	1567.5
10/01/81	1569.3	10/01/88	1569.5	10/01/95	1568.6
11/01/81	1569.7	11/01/88	1568.4	11/01/95	1568.5
12/01/81	1569.6	12/01/88	1568.4	12/01/95	1569.1
01/01/82	1569.5	01/01/89	1568.3	01/01/96	1569.1
02/01/82	1569.5	02/01/89	1568.3	02/01/96	1567.6
03/01/82	1569.7	03/01/89	1568.4	03/01/96	1568.8
04/01/82	1568.8	04/01/89	1568.3	04/01/96	1568.0
05/01/82	1566.3	05/01/89	1564.0	05/01/96	1567.8
06/01/82	1566.9	06/01/89	1567.7	06/01/96	1568.7
07/01/82	1567.2	07/01/89	1567.4	07/01/96	1568.0
08/01/82	1568.3	08/01/89	1568.3	08/01/96	1568.1
09/01/82	1568.2	09/01/89	1568.6	09/01/96	1568.8
10/01/82	1568.0	10/01/89	1568.8	10/01/96	1568.4
11/01/82	1569.7	11/01/89	1568.5	11/01/96	1568.1
12/01/82	1569.7	12/01/89	1567.3	12/01/96	1568.1
01/01/83	1569.8	01/01/90	1568.3	01/01/97	1568.8
02/01/83	1569.7	02/01/90	1568.3	02/01/97	1568.7
03/01/83	1570.0	03/01/90	1568.3	03/01/97	1568.7
04/01/83	1569.1	04/01/90	1570.0	04/01/97	1568.6
05/01/83	1567.7	05/01/90	1568.8	05/01/97	1569.3
06/01/83	1567.4	06/01/90	1568.7	06/01/97	1568.5
07/01/83	1569.2	07/01/90	1568.6	07/01/97	1568.3
08/01/83	1569.2	08/01/90	1568.5	08/01/97	1568.0
09/01/83	1566.2	09/01/90	1568.1	09/01/97	1569.0
10/01/83	1564.0	10/01/90	1568.4	10/01/97	1568.0
11/01/83	1564.0	11/01/90	1568.4	11/01/97	1568.2
12/01/83	1564.1	12/01/90	1568.3	12/01/97	1569.0
01/01/84	1564.2	01/01/91	1568.1	01/01/98	1568.9
02/01/84	1564.1	02/01/91	1568.1	02/01/98	1568.7
03/01/84	1564.4	03/01/91	1568.1	03/01/98	1568.8
04/01/84	1562.7	04/01/91	1565.5	04/01/98	1568.5
05/01/84	1557.8	05/01/91	1566.7	05/01/98	1568.3
06/01/84	1568.4	06/01/91	1567.9	06/01/98	1569.7
07/01/84	1568.6	07/01/91	1568.8	07/01/98	1567.4

08/01/84	1568.9	08/01/91	1568.4	08/01/98	1568.3
09/01/84	1567.1	09/01/91	1568.7	09/01/98	1565.3
10/01/84	1568.7	10/01/91	1568.6	10/01/98	1566.8
11/01/84	1568.4	11/01/91	1568.4	11/01/98	1566.3
12/01/84	1568.5	12/01/91	1568.3	12/01/98	1569.1
01/01/85	1568.5	01/01/92	1568.3	01/01/99	1568.9
02/01/85	1568.3	02/01/92	1568.5	02/01/99	1568.3
03/01/85	1568.3	03/01/92	1568.5	03/01/99	1569.0
04/01/85	1568.0	04/01/92	1568.1	04/01/99	1568.8
05/01/85	1567.4	05/01/92	1568.0	05/01/99	1568.9
06/01/85	1568.8	06/01/92	1568.5	06/01/99	1568.3
07/01/85	1568.7	07/01/92	1568.6	07/01/99	1568.1
08/01/85	1567.9	08/01/92	1568.4	08/01/99	1568.3
09/01/85	1568.1	09/01/92	1568.7	09/01/99	1568.5
10/01/85	1561.5	10/01/92	1568.2	10/01/99	1567.7
11/01/85	1557.4	11/01/92	1568.7	11/01/99	1568.2
12/01/85	1557.3	12/01/92	1568.6	12/01/99	1569.1
01/01/86	1557.4	01/01/93	1568.8	01/01/00	1568.9
02/01/86	1557.6	02/01/93	1568.7	02/01/00	1568.6
03/01/86	1557.9	03/01/93	1568.7	03/01/00	1568.6
04/01/86	1557.7	04/01/93	1568.4	04/01/00	1568.2
05/01/86	1567.0	05/01/93	1568.2	05/01/00	1568.3
06/01/86	1569.0	06/01/93	1569.2	06/01/00	1568.2
07/01/86	1568.5	07/01/93	1568.0	07/01/00	1567.8
08/01/86	1568.3	08/01/93	1568.3	08/01/00	1567.0
09/01/86	1565.4	09/01/93	1568.6	09/01/00	1565.9
10/01/86	1568.1	10/01/93	1567.4		
11/01/86	1568.0	11/01/93	1568.4		
12/01/86	1567.8	12/01/93	1568.2		
01/01/87	1567.9	01/01/94	1568.2		
02/01/87	1567.8	02/01/94	1568.3		
03/01/87	1567.8	03/01/94	1568.3		
04/01/87	1567.4	04/01/94	1568.0		
05/01/87	1569.4	05/01/94	1568.7		
06/01/87	1569.9	06/01/94	1568.7		
07/01/87	1569.2	07/01/94	1568.0		
08/01/87	1569.2	08/01/94	1562.6		
09/01/87	1569.6	09/01/94	1562.8		

Appendix D

Tribal Correspondence

Letter or communication to	From	Date	Topic
Yakama Nation	Reclamation	June 30, 2003	Response to comment letter
Reclamation	Yakama Nation	May 30, 2003	Banks Lake EIS comments
Spokane Tribe	Reclamation	March 12, 2003	Historic Resources Reports
Reclamation	Spokane Tribe	February 13, 2003	Request for cultural resource survey
Spokane Tribe	Reclamation	February 18, 2003	A meeting with tribe
CCT	Reclamation	February 18, 2003	A meeting with tribe
Yakama Nation Spokane Tribe CCT	Reclamation	January 6, 2003	Transmittal of DEIS
Yakama Nation Spokane Tribe CCT	Reclamation	May 9, 2001	Scoping Meeting notice

7-1596B (9-89)
Bureau of Reclamation

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Columbia Area Office
1917 Marsh Road
Yakima, Washington 98901-2058

IN REPLY REFER TO:
UCA-1000
ENV-1.10

JUN 30 2003

Ms. LaRena Sohappy
Chairperson
YN-Cultural Committee
Confederated Tribes and Bands of the Yakama Nation
P.O. Box 151
Toppenish, WA 98948

Subject: Comments on Banks Lake Drawdown Draft Environmental Impact Statement (IES)

Dear Ms. Sohappy:

Thank you for your letter of May 30, 2003, identifying some of the Yakama Nation's (YN) concerns with the potential drawdown of Banks Lake during the month of August each year to enhance flows in the Columbia River for out migrating salmon smolt. Reclamation is aware that Banks Lake lies partially within lands ceded under the 1855 Treaty as is discussed in Chapter 3 of the draft EIS.

With respect to the Banks Lake drawdown project, we wrote to the Tribal Chairman on May 9, 2001, with a copy to Mr. Johnson Meninick, requesting input from the YN on the scoping process for the EIS. We sent the draft EIS to the YN by letter dated January 6, 2003 and requested comments during a comment period that extended to March 10, 2003. We extended the comment period to April 11, 2003 in a letter to the Tribal Chairman dated March 4, 2003. During the comment period, Mr. B.J. Howerton of my staff also made informal contacts with staff from the Cultural Resource program soliciting comments on the draft EIS.

The draft EIS includes maps of the project area For purposes of confidentiality, we did not include maps showing known historic or cultural resource sites at Banks Lake in the draft EIS. We summarized what is know about those sites in Chapter 3 of the draft EIS, and we will update that summary in the final EIS. We are available to meet with you to discuss the historic and cultural resource inventories that were used for the analysis and could provide you with copies of the documents and maps at that time.

We have completed the historic and cultural resource work necessary to complete the final EIS. However, should the proposed drawdown be selected as the preferred alternative, additional work would be necessary. While Reclamation has on-call contractors through whom we carry out the bulk of our historic and cultural resource survey and inventory work, some aspects of the survey and inventory work may be available for other contractors, including the YN. Such was the case with the survey work carried out by the YN for Reclamation as part of our Scattered Tracts Resource Management Plan land disposal process. Reclamation continues to have contractors work on cultural resources at Banks Lake as part of its implementation of the Banks Lake Resource Management Plan. The need to develop a Cultural Resource Management Plan (CRMP) was recognized as part of that planning process. While we don't expect to begin that process immediately, we would welcome input from the YN concerning development of the CRMP when that process starts.

If you have any questions or comments regarding the Banks Lake drawdown project please contact Mr. Jim Blanchard in our Ephrata Field Office at 509-754-0226. If you desire additional information concerning the historic and cultural resource assessment included in the draft EIS or would like to meet with us to discuss that assessment, please contact our Upper Columbia Area Office archeologist, Mr. Mark DeLeon, at 509-575-5848, extension 320.

Sincerely,

Eric Glover

J. Eric Glover
Area Manager

bc: D-8580
PN-1703, PN-6519
UCA-1600, UCA-1613, EPH-2000, EPH-2003

WBR:JEGlover:dvm:06/27/03:509-575-5848
W:BanksLakeEISYN

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

OF RECLAMATION

May 30, 2003

J. Eric Glover
Area Manager
Bureau of Reclamation
Upper Columbia Area Office
1917 Marsh Road
Yakima, Washington 98909-2058

Re: Banks Lake Drawdown Draft EIS

Dear Mr. Glover:

Thank you for providing the Confederated Tribes and Bands of the Yakama Nation (YN) information on the Banks Lake Drawdown Draft Environmental Impact Statement (EIS).

In order to facilitate a clearer understanding of the reserved treaty rights to the Yakama People under (12 stat. 951) I refer you to the Treaty with the Yakama's, of June 9, 1855 most specifically Article I of that Treaty. Article I identifies the lands Ceded to the United States. The Ceded area clearly includes the area of the Banks Lake Drawdown.

We find it deeply concerning that the Bureau of Reclamation have failed to involve the YN in the early scoping and planning phases of this draft EIS. This failure to actively consult with the YN leaves us with no other choice but to oppose this drawdown because of its failure to address several cultural resource concerns.

Should this drawdown proceed on its current schedule the Yakama Nation would insist that all cultural resource management of the area of potential effect (APE) involve the active participation of the Yakama Nation.

In order for this participation to occur, at this late stage of the process, the YN will require all necessary maps of the project area. Submit these maps direct to the Cultural Resource Program. With this information we will prepare a Scope of Work, detailed budget and contract for the involvement of the YN Cultural Resource Management Program.

This letter serves as a notice of intent from the YN Tribal Council Cultural Committee that it is the YN desire to participate in any future cultural resource investigations of the Banks Lake Drawdown Project that will be required to fulfill the Bureau of Reclamation's Section 106 and 110 responsibilities under the national Historic Preservation Act as amended.

Please send all information regarding this project to Yakama Nation Cultural Resource Program, PO Box 151, Toppenish, Wa. 98948 with a cc: to Carroll Palmer, Deputy Director YN-DNR and LaRena Sohappy, Chairperson YN-Cultural Committee.

Sincerely,

LaRena Sohappy
Chairperson, YN-Cultural Committee

cc: Carroll Palmer
Johnson Meninick
Cultural Committee Members
file

7-1596B (9-89)
Bureau of Reclamation

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Columbia Area Office
1917 Marsh Road
Yakima, Washington 98901-2058

IN REPLY REFER TO:
UCA-1613
ENV-1.10

MAR 12 2003

Mr. Randy Abrahamson
Tribal Historic Preservation Officer
Spokane Tribe of Indians
P.O. Box 100
Wellpinit, WA 99040

Subject: Banks Lake Historic Resources Reports

Dear Mr. Abrahamson:

Your letter dated February 13, 2003, to Mr. Jim Blanchard regarding your request for survey information related to the proposed Banks Lake drawdown was forwarded to me for a reply.

Attached are three draft historic resources reports on two Reclamation undertakings at Banks Lake. The first is a class III inventory as a component of the resources management plan. This was a multi-year survey begun in 1999 by the History & Archaeology Department of the Colville Confederated Tribes (CCT). The first phase of this survey, with a report date of 2000, left a small number of acreage un-surveyed; therefore, a subsequent phase completed the ground coverage as well as test excavated several American Indian sites. The report for the latter phase has been received recently, dated 2002.

The second survey has also been received recently, also done by CCT, and covers the drawdown zone, which is the subject of the proposed undertaking that generated your letter.

We will appreciate your comments on these reports. I can be reached at 509-575-5848, extension 320, or via email at mdeleon@pn.usbr.gov.

Sincerely,

Mark DeLeon

Mark DeLeon
Area Archeologist

Enclosures

Spokane Tribe of Indians

P.O. Box 100 • Wellpinit, WA 99040 • (509) 258-4581 • Fax 258-9243

CENTURY OF SURVIVAL
1881-1981

February 13, 2003

Jim Blanchard
Bureau of Reclamation
32 C Street, P.O. Box 815
Ephrata WA 98823 - 0815

RE: Banks Lake Drawdown

Mr. Blanchard :

Thank you for inviting the Spokane Tribe of Indians to be a consulting party is greatly appreciated, our tribe does express interest in all undertaking in our aboriginal territory.

Please provide this office with your cultural resource survey of the project area, we like the opportunity to review this portion of your project and planning when it is available.

We look forward to your earliest response to our request.

Any further question or comment can be made to my office (509) 258 - 4315.

Sincerely

Randy Abrahamson
Tribal Historic Preservation Officer.

Bureau of Reclamation Phone Log
February 18, 2003

Pacific Northwest Region

Subject: Banks Lake Drawdown Draft EIS

Person Called: Al Peone, Chair, Spokane Tribal Business Council
Person Placing Call: Jim Blanchard
Telephone: 509-258-4581

Date: 2/18/03

Time: 8:30

Summary: Per our letter to the Tribes on the Draft EIS, I contacted Mr. Peone to ask if they wanted to have a Government-to-Government meeting with Reclamation on the DEIS. Mr. Peone stated that he would contact the head of the Natural Resource Department and call back. He made a return call in about 30 minutes and said that he had left a message with the NRD and that there might also be concerns with the Cultural department. They would get back to me with any concerns. NRD (Rudy Peone) called about 11:30 and said that their fishery people would be making comments around the first of March.

Follow up Needed: No follow up needed at this time. Waiting for the Spokanes to contact us.

Bureau of Reclamation Phone Log
February 18, 2003

Pacific Northwest Region

Subject: Banks Lake Drawdown Draft EIS
Person Placing Call: Jim Blanchard
Person Called: Joe Pakootas, Chair, Tribal Business Council, Colville Confederated Tribes.

Telephone: 509-634-2204

Date: 2/18/03

Time: 8:15

Summary: Per our letter to the Tribes on the Draft EIS, I contacted Mr. Pakootas to ask if they wanted to have a Government-to-Government meeting with Reclamation on the DEIS. Mr. Pakootas stated that he would contact the head of the Natural Resource committee to see if there were issues, but then changed that to state that he would contact Adeline Fredin to see if she wanted to meet. He was going to have Ms. Fredin give me a call on this.

Follow up Needed: No follow up needed at this time. Waiting for CCT to contact us.

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Columbia Area Office
1917 Marsh Road
P.O. Box 1749
Yakima, Washington 98907-1749

IN REPLY REFER TO:

UCA-1600
ENV-1.10

JAN - 6 2003

Mr. Ross Sockzehigh, Chairman
Yakama Tribal Council
Yakama Nation
P.O. Box 151
Toppenish, WA 98948

Subject: Banks Lake Drawdown, Douglas and Grant Counties, Washington, Draft Environmental Impact Statement

Dear Mr. Sockzehigh:

Enclosed for review and comment is a copy of the Draft Environmental Impact Statement (Draft EIS) for the Banks Lake Drawdown, Washington. The Draft EIS examines the impacts of alternatives to lower the minimum surface elevation for Banks Lake in August from 1565 feet to 1560 feet.

The Action Alternative describes the resource conditions that would occur between Banks Lake surface elevations of 1570 feet and 1560 feet, while the No Action Alternative describes the conditions that would occur without the proposed action, between surface elevation 1570 feet and 1565 feet. Both the No Action and Action Alternatives include four potential operational scenarios that could occur within their respective ranges.

The Action Alternative includes a refill of the reservoir to elevation 1565 feet, beginning September 1 and ending no later than September 10.

Written comments must be received no later than March 10, 2003, by Mr. Jim Blanchard, Special Projects Officer, Bureau of Reclamation, 32 C Street, P.O. Box 815, Ephrata, WA 98823-0815; or by fax to 509-754-0239, or by email to jblanchard@pn.usbr.gov. For information, telephone 509-754-0226. During the public comment period we would like to meet with the Yakama Nation to discuss the proposed project at a government to government level. Reclamation will contact you shortly to arrange such a meeting at your convenience.

Two public hearings will be held to accept oral comments on the Draft EIS.

Tuesday, February 11, 2003
Coulee City Elementary School
410 W. Locust
Coulee City, Washington

Wednesday, February 12, 2003
District 5 Fire Station Training Facility
12801 Nelson Road
Moses Lake, Washington

The public hearing facilities are physically accessible. Persons who need accessibility accommodations, including sign language interpreters or other auxiliary aids, may contact Mr. Blanchard at 509-754-0226 (relay users may dial 711). Requests should be made as early as possible to allow sufficient time to arrange for accommodation.

Requests to make oral comments at the public hearings may be made at each hearing. Comments will be recorded by a court reporter. Speakers will be called in the order of their requests. In the interest of available time, each speaker will be asked to limit oral comments to five (5) minutes. Longer comments should be summarized at the public hearing and submitted in writing either at the public hearing or identified as hearing comments and sent to be received by Mr. Blanchard no later than March 10, 2003 (the end of the public comment period).

Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There may also be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

Those wishing to obtain a copy of the Draft EIS in the form of a printed document or on compact disk (CD-ROM with reader included) or a Summary of the Draft EIS may contact Mr. Blanchard at the address or phone number given above.

The Draft EIS is available for viewing on the Internet at <http://www.pn.usbr.gov>.

Sincerely,

Eric Glover

J. Eric Glover
Area Manager

Enclosure

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Columbia Area Office
1917 Marsh Road
P.O. Box 1749
Yakima, Washington 98907-1749

IN REPLY REFER TO:

UCA-1600
ENV-1.10

JAN - 6 2003

Mr. Alfred Peone, Chairman
Spokane Business Council
Spokane Tribe of Indians
P.O. Box 100
Wellpinit, WA 99040

Subject: Banks Lake Drawdown, Douglas and Grant Counties, Washington, Draft Environmental Impact Statement

Dear Mr. Peone:

Enclosed for review and comment is a copy of the Draft Environmental Impact Statement (Draft EIS) for the Banks Lake Drawdown, Washington. The Draft EIS examines the impacts of alternatives to lower the minimum surface elevation for Banks Lake in August from 1565 feet to 1560 feet.

The Action Alternative describes the resource conditions that would occur between Banks Lake surface elevations of 1570 feet and 1560 feet, while the No Action Alternative describes the conditions that would occur without the proposed action, between surface elevation 1570 feet and 1565 feet. Both the No Action and Action Alternatives include four potential operational scenarios that could occur within their respective ranges.

The Action Alternative includes a refill of the reservoir to elevation 1565 feet, beginning September 1 and ending no later than September 10.

Written comments must be received no later than March 10, 2003, by Mr. Jim Blanchard, Special Projects Officer, Bureau of Reclamation, 32 C Street, P.O. Box 815, Ephrata, WA 98823-0815; or by fax to 509-754-0239, or by email to jblanchard@pn.usbr.gov. For information, telephone 509-754-0226. During the public comment period we would like to meet with the Spokane Tribe to discuss the proposed project at a government to government level. Reclamation will contact you shortly to arrange such a meeting at your convenience.

Two public hearings will be held to accept oral comments on the Draft EIS.

Tuesday, February 11, 2003
Coulee City Elementary School
410 W. Locust
Coulee City, Washington

Wednesday, February 12, 2003
District 5 Fire Station Training Facility
12801 Nelson Road
Moses Lake, Washington

The public hearing facilities are physically accessible. Persons who need accessibility accommodations, including sign language interpreters or other auxiliary aids, may contact Mr. Blanchard at 509-754-0226 (relay users may dial 711). Requests should be made as early as possible to allow sufficient time to arrange for accommodation.

Requests to make oral comments at the public hearings may be made at each hearing. Comments will be recorded by a court reporter. Speakers will be called in the order of their requests. In the interest of available time, each speaker will be asked to limit oral comments to five (5) minutes. Longer comments should be summarized at the public hearing and submitted in writing either at the public hearing or identified as hearing comments and sent to be received by Mr. Blanchard no later than March 10, 2003 (the end of the public comment period).

Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There may also be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

Those wishing to obtain a copy of the Draft EIS in the form of a printed document or on compact disk (CD-ROM with reader included) or a Summary of the Draft EIS may contact Mr. Blanchard at the address or phone number given above.

The Draft EIS is available for viewing on the Internet at <http://www.pn.usbr.gov>.

Sincerely,

Eric Glover

J. Eric Glover
Area Manager

Enclosure

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Columbia Area Office
1917 Marsh Road
P.O. Box 1749
Yakima, Washington 98907-1749

IN REPLY REFER TO:

UCA-1600
ENV-1.10

JAN 6 2003

Mr. Joseph Pakootas, Chairman
Colville Business Council
Confederated Tribes of the Colville Reservation
P.O. Box 150
Nespelem, WA 99155

Subject: Banks Lake Drawdown, Douglas and Grant Counties, Washington, Draft Environmental Impact Statement

Dear Mr. Pakootas:

Enclosed for review and comment is a copy of the Draft Environmental Impact Statement (Draft EIS) for the Banks Lake Drawdown, Washington. The Draft EIS examines the impacts of alternatives to lower the minimum surface elevation for Banks Lake in August from 1565 feet to 1560 feet.

The Action Alternative describes the resource conditions that would occur between Banks Lake surface elevations of 1570 feet and 1560 feet, while the No Action Alternative describes the conditions that would occur without the proposed action, between surface elevation 1570 feet and 1565 feet. Both the No Action and Action Alternatives include four potential operational scenarios that could occur within their respective ranges.

The Action Alternative includes a refill of the reservoir to elevation 1565 feet, beginning September 1 and ending no later than September 10.

Written comments must be received no later than March 10, 2003, by Mr. Jim Blanchard, Special Projects Officer, Bureau of Reclamation, 32 C Street, P.O. Box 815, Ephrata, WA 98823-0815; or by fax to 509-754-0239, or by email to jblanchard@pn.usbr.gov. For information, telephone 509-754-0226. During the public comment period we would like to meet with the Colville Confederated Tribes to discuss the proposed project at a government to government level. Reclamation will contact you shortly to arrange such a meeting at your convenience.

Two public hearings will be held to accept oral comments on the Draft EIS.

Tuesday, February 11, 2003
Coulee City Elementary School
410 W. Locust
Coulee City, Washington

Wednesday, February 12, 2003
District 5 Fire Station Training Facility
12801 Nelson Road
Moses Lake, Washington

The public hearing facilities are physically accessible. Persons who need accessibility accommodations, including sign language interpreters or other auxiliary aids, may contact Mr. Blanchard at 509-754-0226 (relay users may dial 711). Requests should be made as early as possible to allow sufficient time to arrange for accommodation.

Requests to make oral comments at the public hearings may be made at each hearing. Comments will be recorded by a court reporter. Speakers will be called in the order of their requests. In the interest of available time, each speaker will be asked to limit oral comments to five (5) minutes. Longer comments should be summarized at the public hearing and submitted in writing either at the public hearing or identified as hearing comments and sent to be received by Mr. Blanchard no later than March 10, 2003 (the end of the public comment period).

Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There may also be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

Those wishing to obtain a copy of the Draft EIS in the form of a printed document or on compact disk (CD-ROM with reader included) or a Summary of the Draft EIS may contact Mr. Blanchard at the address or phone number given above.

The Draft EIS is available for viewing on the Internet at <http://www.pn.usbr.gov>.

Sincerely,

Eric Glover

J. Eric Glover
Area Manager

Enclosure

MAY - 9 2001

EPH-2003
ENV-6.00

Mr. Lonnie Selam, Sr.
Chairman, Tribal Council
Conf. Trbs. & Bnds. of the Yak. Ind. Na.
PO Box 151
Toppenish WA 98948

Subject: Scoping Meeting for Enviromental Impact Statement (EIS) on Study of Potential Drawdown of Banks Lake in Support of Fish Flows in the Columbia River

Dear Mr. Selam:

Reclamation, in support of the 2000 FCRPS biological opinion, will conduct a study of the impact of a drawdown of Banks Lake from elevation 1565 feet to 1560 feet to supplement Columbia River flows during the month of August. This study is outlined in action 31 of the opinion. To assist in this study Reclamation is hosting a scoping meeting on May 15, 2001, from 7 p.m to 9 p.m. at the Coulee City Middle School, 312 E Main Street, Coulee City, Washington.

This meeting will be the first step in a pubic involvement process that will lead to an EIS discussing the impacts of the drawdown. You are invited to attend the meeting and help us develop the issues associated with this drawdown or write to this office with your comments.

We want to point out that this study is not connected with the recently completed Environmental Assessment for the Banks Lake Resource Management Plan, even though we do understand that many of the same issues and resources will be common to both efforts.

If you should have any questions concerning the meeting, please call Jim Blanchard at (509) 754-0226.

Sincerely,

Dona D Postma

ACTING FOR

William D. Gray
Deputy Area Manager

MAY - 9 200?

EPH-2003
ENV-6.00

Mr. Bruce Wynne
Chairman, Spokane Tribe of Indians
PO Box 100
Wellpinit WA 99040

Subject: Scoping Meeting for Enviromental Impact Statement (EIS) on Study of Potential Drawdown of Banks Lake in Support of Fish Flows in the Columbia River

Dear Mr. Wynne:

Reclamation, in support of the 2000 FCRPS biological opinion, will conduct a study of the impact of a drawdown of Banks Lake from elevation 1565 feet to 1560 feet to supplement Columbia River flows during the month of August. This study is outlined in action 31 of the opinion. To assist in this study Reclamation is hosting a scoping meeting on May 15, 2001, from 7 p.m to 9 p.m. at the Coulee City Middle School, 312 E Main Street, Coulee City, Washington.

This meeting will be the first step in a pubic involvement process that will lead to an EIS discussing the impacts of the drawdown. You are invited to attend the meeting and help us develop the issues associated with this drawdown or write to this office with your comments.

We want to point out that this study is not connected with the recently completed Environmental Assessment for the Banks Lake Resource Management Plan, even though we do understand that many of the same issues and resources will be common to both efforts.

If you should have any questions concerning the meeting, please call Jim Blanchard at (509) 754-0226.

Sincerely,

Donna D Postma

William D. Gray
ACTING FOR Deputy Area Manager

MAY - 9 2001

EPH-2003
ENV-6.00

Ms. Colleen F Cawston
Chairperson, Colville Business Council
Confederated Tribe of the Colville Reservation
PO Box 150
Nespelem WA 99155

Subject: Scoping Meeting for Enviromental Impact Statement (EIS) on Study of Potential Drawdown of Banks Lake in Support of Fish Flows in the Columbia River

Dear Ms. Cawston:

Reclamation, in support of the 2000 FCRPS biological opinion, will be conducting a study of the impact of a drawdown of Banks Lake from elevation 1565 feet to 1560 feet to supplement Columbia River flows during the month of August. This study is outlined in action 31 of the opinion. To assist in this study Reclamation is hosting a scoping meeting on May 15, 2001, from 7 p.m to 9 p.m. at the Coulee City Middle School, 312 E Main Street, Coulee City, Washington.

This meeting will be the first step in a pubic involvement process that will lead to an EIS that discusses the impacts of the drawdown. You are invited to attend the meeting and help us develop the issues associated with this drawdown or write to this office with your comments.

We want to point out that this study is not connected with the recently completed Environmental Assessment for the Banks Lake Resource Management Plan, even though we do understand that many of the same issues and resources will be common to both efforts.

If you should have any questions concerning the meeting, please call Jim Blanchard at (509) 754-0226.

Sincerely,

Dana D Postma

ACTING FOR William D. Gray
Deputy Area Manager

Appendix E

Environmental Commitments

Appendix E

Environmental Commitments

The following describes the environmental commitments that Reclamation will include in the Record of Decision if the Action Alternative is implemented. Environmental commitments include any mitigation measures identified for the resource components evaluated in chapter 4, as well as commitments made in response to the Fish and Wildlife Coordination Act Report recommendations. However, the preferred alternative identified in this document is the No Action Alternative and these environmental commitments would not be necessary or implemented if the No Action Alternative is selected for implementation.

Recreation

Extending boat launches, modifying mooring docks, and dredging deeper channels would improve watercraft access at lower water levels. Funds would be provided to ensure that usable boat ramps, courtesy docks, and swimming areas still exist on both the north and south ends of Banks Lake so that public access will be maintained to the lake for recreational purposes.

Historic Resources

Historic resources that are eligible for the National Register must be managed, and they are eligible for the register until they are determined ineligible. Of concern, however, is that none of the identified properties have yet been formally evaluated for the National Register. This, in itself, is a large task, and it is reasonable to assume that a majority of the known historic resources would be determined ineligible. Nevertheless, an unknown number would be eligible, and management treatments for them present yet another large task. Some of these treatments may involve data recovery, some may safely be left alone, and others may require conservation measures to prevent damage from natural forces.

If the Action Alternative is selected, Reclamation will conduct archeological surveys of the lands exposed by the additional 5-foot drawdown and would complete test excavations to determine site eligibility. In consultation with SHPO and the tribes, Reclamation would define treatments to protect or mitigate impacts to the most significant historic properties.

Traditional Cultural Properties

Management of traditional cultural properties is a relatively new component of historic preservation and few protocols exist to protect them without a Federal action, as well as provide mitigation in the face of an agency action. In a landscape, such as Banks Lake, where the native cultures are strongly associated, non-material values, such as traditional cultural properties, are difficult to quantify and protect. Evaluation of three known TCP sites within the drawdown area elevation of 1570 to 1565 feet will occur.

Reclamation will consult with tribes to further define actions that might reduce or avoid impacts to National Register eligible TCPs. To the extent consistent with agency authority and multiple use project purposes, Reclamation will implement actions to avoid or reduce impacts.

Coordination Act Report Recommendations

In accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 USC 661 et seq.), the U.S. Fish and Wildlife Service (Service) provided a final Coordination Act Report documenting wildlife resources, habitat, and management concerns within the drawdown study area (Service, 2002) to assist in developing this document. The final Coordination Act Report is attached as appendix A.

If the Action Alternative if implemented, Reclamation will implement the following recommendations contained in the Coordination Act Report:

- Some mitigation actions for various adverse impacts (existing and potential future impacts) could include the establishment of native riparian vegetation in various areas of the drawdown zone, such as native bunchgrasses and forbs in shrub-steppe and riparian vegetation along the shorelines. The limited time frame of this drawdown may limit the logistical feasibility of this mitigation.

- If the 10-foot drawdown is implemented, Reclamation should ensure timely refill of Banks Lake up to 1565 feet by early September to ensure operation of net-pens.

- Reclamation shall work collaboratively with the WDFW and the Service to develop studies that would examine the effects or lack of effects of the proposed drawdown on rearing fish species in Banks Lake.

- The Service recommends Reclamation develop a short-term plan that would address potential modifications of current boat ramp and moorage facilities in order to facilitate summer use activities.

- Reclamation should ensure that a complement of riparian vegetation be maintained along the Banks Lake drawdown zone and that conditions should be sufficient to provide for short-term input of nutrients into the water column as Banks Lake approaches its refill goal.

- A study to determine the reproductive success of western grebes in the study area should be initiated to help determine the level of management that should be applied to protect these birds in light of the proposed drawdown.

- Hatchery compensation via the WDFW is an option that Reclamation should pursue if lack of recruitment for certain fish populations is linked to the proposed drawdown.

- Protection of habitat, such as shrub-steppe, from fire is important, in this and region because it does not recover quickly from fire. Attempts should be made to ensure shoreline access to water resources in the event of uncontrolled wildfire in these designated shrub-steppe areas.

- Updating the GIS [geographic information system] work that was done at Banks Lake by Reclamation would be valuable. Aside from changes that will occur over time, this would allow some of the errors the Service identified in its 1998 Planning Aid Memorandum (U.S. Fish and Wildlife Service 1998) to be corrected and a more accurate vegetation map to be generated to determine potential wetland impacts linked to the drawdown and concurrent management actions.

- Reclamation should initiate studies to examine the potential effects of the drawdown on wildlife species.

.