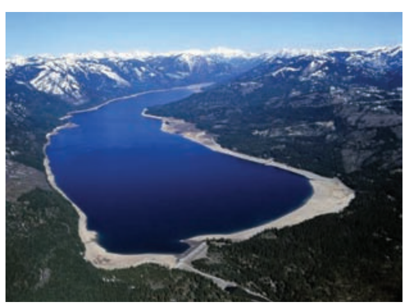
FINAL ENVIRONMENTAL IMPACT STATEMENT

Yakima River Basin Integrated Water Resource Management Alternative

Conducted as part of the Yakima River Basin Water Storage Feasibility Study



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Final
Environmental Impact Statement
Yakima River Basin Integrated Water Resource Management Alternative

Conducted as part of the Yakima River Basin Water Storage Feasibility Study

This report is available on the Department of Ecology Web site at:
http://www.ecy.wa.gov/programs/wr/cwp/cr_yak_storage.html

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
15 W Yakima Ave, Ste 200 • Yakima, WA 98902-3452 • (509) 575-2490

June 23, 2009

Dear interested parties:

The Washington State Department of Ecology (Ecology) has prepared and issued this Final Environmental Impact Statement (EIS) pursuant to the State Environmental Policy Act (SEPA) (Chapter 43.21C RCW) and the SEPA Rules (Chapter 197-11 WAC). This Final EIS evaluates impacts associated with an Integrated Water Resource Alternative that incorporates a variety of elements that could address multiple facets of water resource problems in the Yakima River basin.

The analysis was conducted as part of the Yakima River Basin Water Storage Feasibility Study. Ecology and the U.S. Bureau of Reclamation released the Yakima River Basin Water Storage Feasibility Study Draft Planning Report/EIS in January 2008. The document was a joint National Environmental Policy Act (NEPA)/SEPA EIS. After comments were received on the document, Ecology consulted with Reclamation on whether a broader range of alternatives should be evaluated. Reclamation concluded that its congressional authorization precluded it from expanding its analysis under NEPA. Therefore, Ecology decided to separate from the joint NEPA/SEPA process and prepared a Supplemental Draft EIS as a SEPA document. In the Supplemental Draft EIS, Ecology developed an Integrated Water Resource Management Alternative that responds to comments on the January 2008 Draft Planning Report/EIS and incorporates a range of alternatives to address water resource problems in the Yakima River basin.

The Supplemental Draft EIS was issued December 10, 2008. The public comment period was open until January 16, 2009. Comments were received via email and mail. The comments received are included in Chapter 6 of this Final EIS. Written responses are provided for each comment. Responses are also included to comments relevant to the State Alternatives from the January 2008 Draft Planning Report/EIS. Where appropriate, changes have been made to the EIS text in response to comments or to provide clarification or updates to information.

Reclamation released the Final EIS on the Yakima River Basin Water Storage Feasibility Study in December 2009. In April 2009, Reclamation announced that it had completed the Yakima River Basin Water Storage Feasibility Study and concluded that none of the action alternatives evaluated met federal criteria for an economically and environmentally sound water project. Ecology and Reclamation will use the Integrated Water Resource Management Alternative Final EIS as the framework for a comprehensive water resource management implementation plan for the Yakima River basin.

Sincerely,

Derek I. Sandison
Office of Columbia River
SEPA Responsible Official

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ACRONYMS AND ABBREVIATIONS

AID	Ahtanum Irrigation District
ATVs	all-terrain vehicles
BCAA	Benton County Air Authority
BMPs	best management practices
BPA	Bonneville Power Administration
C	Celsius
CBA	cost/benefit analysis
CBFWP	Columbia Basin Fish and Wildlife Program
CBP	Columbia Basin Project
CBSP	Columbia Basin System Planning
CELP	Center for Environmental Law and Policy
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHU	Critical Habitat Unit
CRMP	Cultural Resources Management Plan
CTED	Department of Community, Trade, and Economic Development
cy	cubic yards
DAHP	Department of Archaeology and Historic Preservation
DEIS	Draft Environmental Impact Statement
District	Yakima County Flood Control Zone District
DO	dissolved oxygen
DPS	distinct population segment
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EES	Economic and Engineering Services, Inc.
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency

ESA	Endangered Species Act
ET	evapotranspiration
F	Fahrenheit
FCRPS	Federal Columbia River Power System
FERC	Federal Energy Regulatory Commission
FHA	Federal Highway Administration
gpm	gallons per minute
HB	House Bill
GIS	Geographic Information System
HPA	hydraulic project approval
hwy	highway
IPCC	Intergovernmental Panel on Climate Change
KAF	thousand acre-feet
KCCD	Kittitas County Conservation District
KID	Kennewick Irrigation District
KRD	Kittitas Reclamation District
LWD	large woody debris
mg/L	milligrams per liter
Mgd	million gallons per day
mi	miles
msl	mean sea level
MW	Megawatts
MW-hrs	Megawatt-hours
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPCC	Northwest Power and Conservation Council
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places

NTU	nephelometric turbidity units
NWI	National Wetland Inventory
OHWM	ordinary high water mark
PCBs	Polychlorinated biphenyl
PHS	Priority Habitats and Species
PIA	Practically Irrigable Acreage
PIT	Passive Integrated Transponder
Plum Creek	Plum Creek Timber Company
PM10	particulate matter 10 microns or less
ppm	parts per million
RASP	Regional Assessment of Supplementation Project
RCW	Revised Code of Washington
Reclamation	U.S. Bureau of Reclamation
RM	River Mile
SASSI	Salmon and Steelhead Stock Inventory
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SOAC	System Operations Advisory Committee
SRFB	Salmon Recovery Funding Board
Storage Study	Yakima River Basin Water Storage Feasibility Study
SWE	Snow Water Equivalent
TCPs	traditional cultural properties
TDG	total dissolved gas
TDS	total dissolved solids
TMDL	total maximum daily load
TMT	Technical Management Team
Tri-County	Tri-County Water Resource Agency
TWSA	Total Water Supply Available
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service

USGS	U.S. Geological Survey
VQO	Visual Quality Objective
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WEC	Washington Environmental Council
WIP	Wapato Irrigation Project
WRATS	Ecology Water Rights Application Tracking System
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
YBFWRB	Yakima Basin Fish and Wildlife Recovery Board
YKFP	Yakima/Klickitat Fisheries Project
YRBWEP	Yakima River Basin Water Enhancement Project
YSPB	Yakima Subbasin Planning Board
YSS	Yakima Subbasin Summary
YTAHP	Yakima Tributary Access and Habitat Program

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE YAKIMA RIVER BASIN INTEGRATED WATER RESOURCE MANAGEMENT ALTERNATIVE (Conducted as part of the Yakima River Basin Water Storage Feasibility Study)

FACT SHEET

Brief Description of Proposal:

The purpose of the Yakima River Basin Integrated Water Resource Management Alternative is to provide water for irrigated agriculture and future municipal needs and improve habitat for anadromous and resident and anadromous fish. The alternative was developed as part of the Yakima River Basin Water Storage Feasibility Study being undertaken by the Washington Department of Ecology (Ecology) and the U.S. Bureau of Reclamation (Reclamation). Ecology and Reclamation released a Draft Planning Report/Environmental Impact Statement (EIS) in January 2008 in which they jointly evaluated a no action alternative and three storage alternatives—Black Rock reservoir, Wymer reservoir, and Wymer reservoir with a Yakima River pump exchange. Ecology evaluated three additional alternatives—enhanced water conservation, market-based reallocation of water resources, and ground water storage. The three State Alternatives were developed in response to comments received during EIS scoping indicating that Ecology should consider a broader range of alternatives, including non-surface storage options, to meet State Environmental Policy Act (SEPA) requirements for identifying and evaluating reasonable alternatives.

A number of the comments received on the Draft Planning Report/EIS asserted that Reclamation and Ecology failed to evaluate an adequate range of reasonable alternatives and that the alternatives that had been evaluated were analyzed outside of the context of fish habitat and passage needs for the Yakima River basin. Ecology consulted with Reclamation concerning whether additional alternatives should be evaluated. Ecology concluded that the scope of the EIS should be expanded; however, Reclamation determined that its congressional authorization precluded it from expanding its analysis under the National Environmental Policy Act (NEPA). Therefore, Ecology decided to separate from the joint NEPA/SEPA process for the study and to pursue completion of a stand-alone SEPA EIS that built on the January 2008 Draft Planning Report/EIS. Ecology prepared a Supplemental Draft EIS, released December 10, 2008, to evaluate additional water supply alternatives together with related fish habitat improvements. The Integrated Water Resource Management Alternative included in the Supplemental Draft EIS included four general elements to improve water resources in the Yakima River basin—fish passage improvements, modifying existing operations and facilities, new storage, and fish habitat enhancement on mainstem rivers and tributaries. The Integrated Water Resource Management Alternative presented in this Final EIS includes the State Alternatives from the January 2008 Draft Planning Report/EIS. These elements are in addition to the alternatives previously considered in the January 2008 document.

Timeline for the Yakima River Basin Water Storage Feasibility Study:

January 29, 2008—Joint NEPA/SEPA Draft Planning Report/EIS on the Yakima River Basin Water Storage Feasibility Study issued jointly by Ecology and Reclamation.

December 10, 2008—SEPA Supplemental Draft EIS issued by Ecology.

December 19, 2008—NEPA Final Planning Report/EIS on the Yakima River Basin Water Storage Feasibility Study issued by Reclamation.

June 2009—SEPA Final EIS issued by Ecology. This document incorporates substantive information from the preceding documents and responds to comments on the January 2008 Draft Planning Report and the December 2008 Supplemental Draft EIS.

June 30, 2009—Reclamation and Ecology initiate a comprehensive water resource management implementation planning process.

Proposed or Tentative Date for Implementation:

Ecology and Reclamation are convening a work group to help develop an implementation plan for the Integrated Water Resource Management Alternative. The work group will use this Final EIS as a framework for a comprehensive implementation plan. Ecology anticipates that consensus will be reached on a plan within one year. At this time no specific projects have been identified for implementation in this Supplemental Draft EIS. Implementation of specific future projects will require additional environmental review and permitting.

Proponent:

Washington State Department of Ecology in cooperation with the U.S. Bureau of Reclamation

State Environmental Policy Act (SEPA) Lead Agency Responsible Official:

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Permits, Licenses, and Approvals Required for Proposal:
Because the specific nature of projects that will be proposed under the Integrated Water Resource Management Alternative is not yet known, it is not possible to present a complete list of permits, licenses, and approvals that may be required for future projects. It is possible, however, to identify a number of the most common types of permits, licenses, and approvals associated with water resources and habitat that would generally be required for the projects presented in this document. These permits, licenses, and approvals are listed below by the jurisdictional agency:

Federal Permits, Licenses, and Approvals

Section 404 permit – U.S. Army Corps of Engineers
Section 10 permit – U.S. Army Corps of Engineers
Endangered Species Act consultation – NOAA Fisheries
Endangered Species Act consultation – U.S. Fish and Wildlife Service
Special Uses Permit – U.S. Forest Service

State Permits, Licenses, and Approvals

Water use permit/certificate of water right – Department of Ecology
Reservoir permit/aquifer storage and recovery – Department of Ecology
Dam safety permit – Department of Ecology
National Pollutant Discharge Elimination System permit(s) – Department of Ecology
Section 401 water quality certification – Department of Ecology
Shoreline conditional use permit, or variance – Department of Ecology
Water system plan approval – Department of Health
Hydraulic project approval – Department of Fish and Wildlife
Forest practices approval – Department of Natural Resources

Local Permits, Licenses, and Approvals

Critical areas permit or approval – Appropriate local jurisdictional agency
Floodplain development permit – Appropriate local jurisdictional agency
Shoreline substantial development permit, conditional use permit, or variance – Appropriate local jurisdictional agency
Building permit – Appropriate local jurisdictional agency
Clearing and grading permit – Appropriate local jurisdictional agency

Authors and Contributors to the Supplemental Environmental Impact Statement

The following **Department of Ecology** individuals were reviewers or contributors to the preparation of the Supplemental Draft EIS:

Derek Sandison – All chapters
Bob Barwin – Water-based reallocation of water resources sections

The following **contract** individuals were contributors to the Supplemental Draft EIS:

ESA Adolfson – Principal Author, Climate Change, Vegetation and Wildlife, Recreational Resources, Land and Shoreline Use, Air Quality, Noise, Visual Resources, Transportation, Public Health and Safety
Anchor Environmental – Surface Water, Hydropower, Fish and Aquatic Resources, Public Utilities
Cascadia Law Group – Water Rights
EcoNorthwest – Climate Change and Socioeconomics
Golder and Associates – Earth, Ground Water, Water Quality
Paragon Research Associates – Cultural Resources

Timing of Additional Environmental Review:

This SEPA analysis is programmatic in nature and has been prepared to generally address probable significant adverse impacts associated with projects proposed to improve water resources in the Yakima River basin. Any individual projects that are carried forward will require additional environmental review when they are proposed; these projects may require SEPA compliance, NEPA compliance, or both, depending on the implementing agency, source of funding, and/or types of permits required. Projects will be evaluated as they are developed and ready for environmental review, this could occur within the next few years for some items, or as long as several years in the future for other projects.

Date of Issue of the Supplemental Draft Environmental Impact Statement

December 10, 2008

Public Comments on the Draft Supplemental EIS
In accordance with WAC 197-11-455, Ecology conducted a public comment period from December 10, 2008 to January 26, 2009. Ecology received written comments from a total of 71 persons or agencies, including 27 identical emails.

Document Availability

The Final EIS is available for review.

It is available on line and can be viewed at:
http://www.ecy.wa.gov/programs/wr/cwp/cr_yak_storage.html.

The documents can be obtained in hard copy or CD by written request to the SEPA Responsible Official listed above, or by calling 509-454-7673. Persons with disabilities may request this information be prepared and supplied in alternative formats.

The document was distributed through the state library system. Copies are also available for review at any Department of Ecology Yakima office located at 15 West Yakima Avenue, Suite 200 Monday through Friday from 8 a.m. to 5 p.m.

SUMMARY

S.1 Introduction

This State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) on the Yakima River Basin Integrated Water Resource Management Alternative is the concluding step of the Yakima River Basin Water Storage Feasibility Study (Storage Study) that was undertaken by the Washington Department of Ecology (Ecology) and the U.S. Bureau of Reclamation (Reclamation). The flow chart below indicates how the different documents relate to the Storage Study.

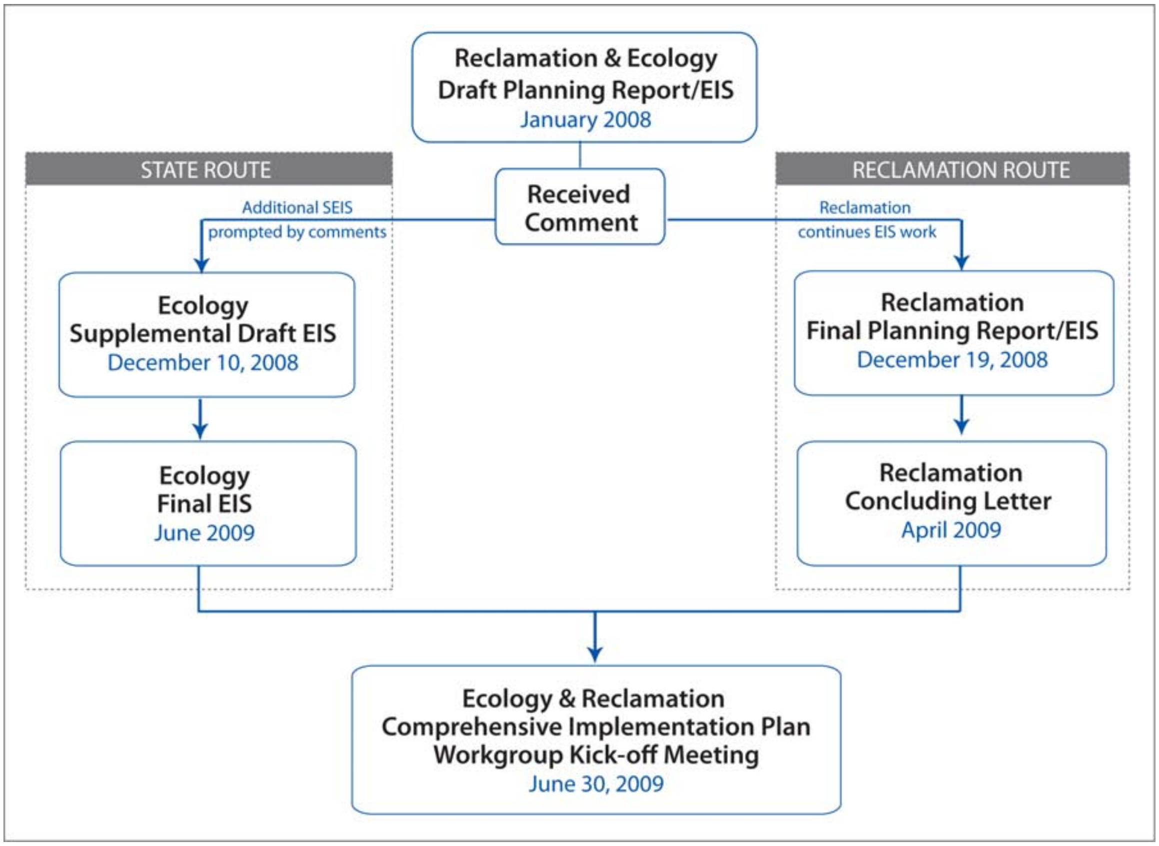


Figure S-1 Flow chart of the Yakima River Basin Water Storage Feasibility Study Process

The information contained in this document is intended to form the basis for a comprehensive water management implementation planning effort being initiated by Reclamation and Ecology under authority of the federal Yakima River Basin Water Enhancement Program (YRBWEP) (Act of December 28, 1979, Public Law 96-162). The Integrated Water Resource Management Alternative provides the framework for linking strategies for addressing instream and out-of-stream water supply, habitat, and passage problems in the Yakima basin under a unified or comprehensive approach.

S.2 Purpose and Need for the Proposal

Reclamation and Ecology released a Draft Planning Report/Environmental Impact Statement (EIS) on the Yakima Basin Storage Feasibility Study in January 2008. In response to comments on that document, Ecology prepared a Supplemental Draft EIS to evaluate an alternative that provides an integrated approach to resolving water resource problems in the Yakima River basin. This Final EIS responds to comments received regarding both documents. It also adds information and analysis that have become available since the Supplemental Draft EIS was issued. The specific objectives of this project are to provide water for irrigated agriculture and future municipal needs, and to improve habitat for anadromous and resident fish. The proposed Integrated Water Resource Management Alternative includes elements for fish passage, modifications to existing facilities and operations, new water storage, ground water storage, fish habitat improvements, enhanced water conservation, and market-based reallocation of water resources to meet those three objectives.

S.3 Description of the Integrated Water Resource Management Alternative

The Integrated Water Resource Management Alternative includes a package of elements to improve water supply and fish habitat. The proposed elements include:

- Fish passage at existing reservoirs as part of a phased program;
    - Cle Elum, Bumping, Kacheelus, Kachess and Tieton Dams.
- Structural and operational changes to existing facilities;
    - Changes to Roza and Chandler Power Plants,
    - Improvements to Wapato Irrigation Project and Chandler fish bypass,
    - Completion of the Kennewick Irrigation District Pump Exchange and similar projects in the lower basin,
    - Improvements to Kittitas Reclamation District facilities, and
    - Completing the Wapatox Project.
- New or expanded storage reservoirs;
    - Naches River basin storage options, including Bumping Lake expansion,
    - Wymer reservoir including new reservoir fill options, and
    - Modification to river operations in conjunction with storage and direct pump projects.
- Ground water storage;
    - Injection recharge with active recovery, and
    - Surface recharge with passive recovery.
- Fish habitat enhancements on the mainstem Yakima River and its tributaries;
    - Reconnecting and reestablishing floodplains and side channels,
    - Enhancing and restoring riparian habitat conditions,
    - Increasing channel complexity, and
    - Fish passage and stream flow improvements on tributaries.

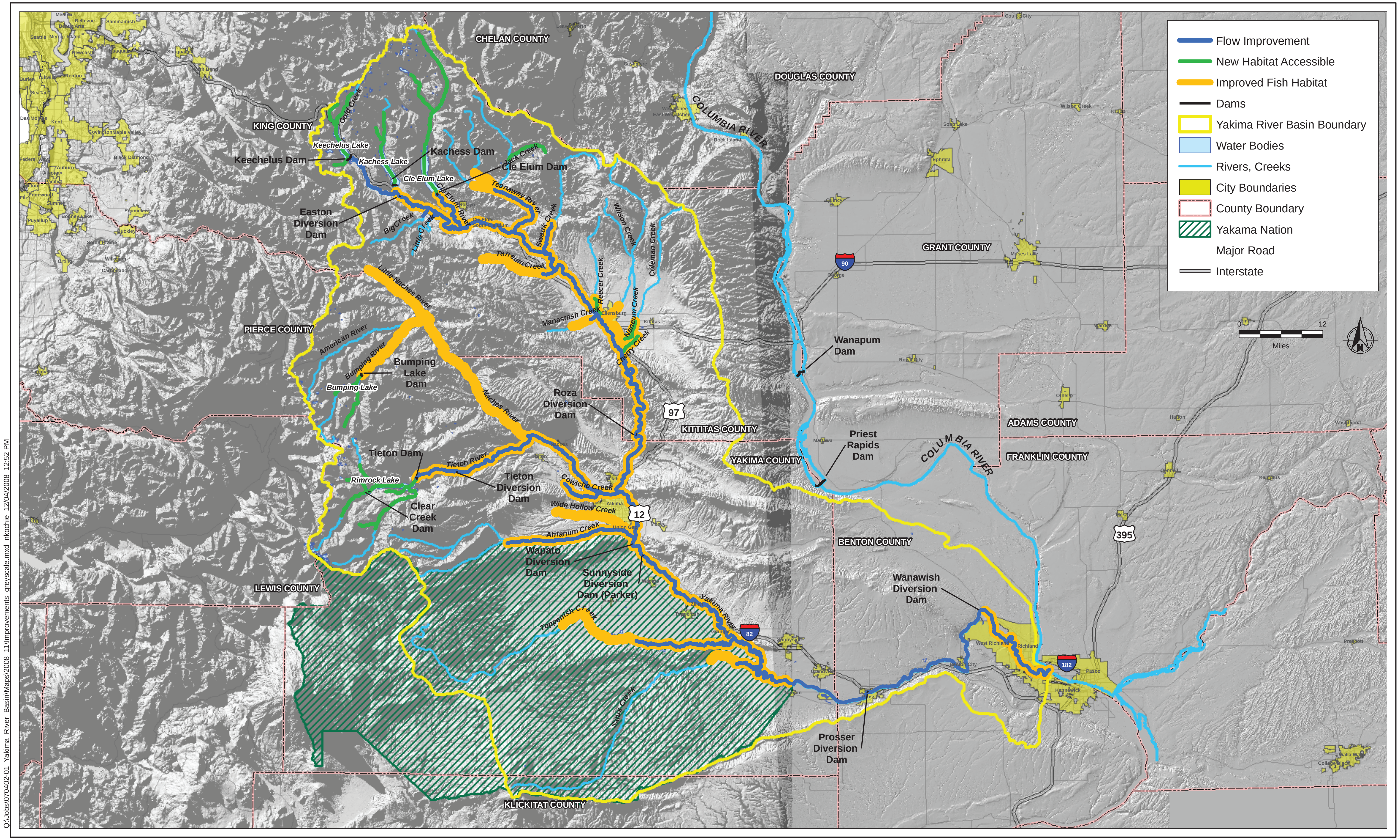
- Enhanced water conservation;
    - Enhanced conservation for irrigation district infrastructure improvements; on-farm conservation and irrigation efficiency improvements; and municipal, commercial, and industrial conservation, and
    - Incentives for conservation including new proposals for the percentage of conserved water retained by the implementing entity and instream flows.
- Market-based reallocation of water resources;
    - Short-term options that are a continuance of existing programs with additional steps taken to reduce impediments to transfer of water for water markets, and
    - Long-term options designed to open the water market to a much larger group of water users and change the administration of water markets.

These elements would be implemented as an integrated package, not as separate projects, to maximize benefits to fisheries and water supply. The Integrated Water Resource Management Alternative would likely be implemented over a period of years. The timeline would depend on available funding.

S.4 Benefits of the Integrated Water Resource Management Alternative

Implementing the different elements of the Integrated Water Resource Management Alternative as a total package is intended to result in greater benefits than implementing any one element alone. Many studies have indicated that ecosystem-level resource management provides greater opportunities for efficiency, synergy, and cooperation between stakeholders which then result in greater overall benefits. For example, providing fish passage at existing reservoirs will open up new habitat for fish, which would benefit fish populations. By also implementing fish habitat improvements and improving flows basin-wide through additional storage and other actions, fish would have improved conditions for survival generally, contributing to increased abundance and productivity. If fish habitat enhancements are implemented without providing fish passage at existing reservoirs and improving flows, the habitat enhancements would have more limited benefits to fish. Figure S-1 graphically illustrates the benefits to flow, habitat, and fish passage that would result from an integrated package.

New storage projects will provide water to reduce proration of irrigators and help meet future municipal needs. They may also provide additional flows for fish and allow existing reservoir operations to be modified to reduce impacts to fish. Enhanced water conservation would provide opportunities to reduce water demand and improve water supply. Market-based reallocation of water resources would provide flexibility to meet the water needs of fish, irrigators, and especially domestic water users. These combined elements may improve the reliability of water supply in drought years and reduce the amount of new storage needed. Ground water storage presents an opportunity to develop storage without the traditional impacts associated with above-ground storage.



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Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure S-2
Summary of Improvements Map
Washington

An integrated approach that contains water storage and facility improvement projects that also meet fish management needs will have the highest likelihood of implementation and success over the long-term. The combined elements presented in this Integrated Water Resource Management Alternative would provide Yakima River basin water and fish managers as well as water users the variety of tools needed to meet their water supply needs and significantly improve conditions for fish.

S.5 Implementation

Ecology intends to work with Reclamation and stakeholders in the Yakima River basin to develop a comprehensive water resource management implementation plan based on the Integrated Water Resource Management Alternative. The implementation plan is considered the third and final phase of YRBWEP. The implementation plan will include selection and prioritization of projects that would be included in the alternative. It is intended that the completed implementation plan will provide the basis for a request by Ecology and basin water users, fish managers and local governments for congressional authorization and state legislative funding.

S.5.1 Who Would Implement the Integrated Water Resource Management Alternative?

It is anticipated that the Integrated Water Resource Management Alternative would be the framework for a comprehensive water resource management implementation plan for the Yakima River basin. It would use the authority of YRBWEP, a federal program jointly funded by Reclamation and Ecology with local matches. For YRBWEP Phase II, a Conservation Advisory Group (CAG) has provided advice on implementation of the conservation component. For the third and final phase of YRBWEP, Reclamation and Ecology have initiated a Work Group to help develop the comprehensive water resource management implementation plan for the Yakima basin. The Work Group will consist of entities and agencies with expertise in water and fish management in the Yakima basin. Reclamation and Ecology have invited the following entities to send representatives to a kickoff meeting: the Yakama Nation; Benton, Kittitas, and Yakima Counties; the City of Yakima; Bonneville Power Administration; NOAA Fisheries; U.S. Fish and Wildlife Service; Washington Department of Agriculture; Washington Department of Fish and Wildlife (WDFW); Roza, Sunnyside Valley, Kennewick, and Yakima-Tieton Irrigation Districts and the Kittitas Reclamation District; Yakima/Klickitat Fisheries Project; Yakima Basin Fish and Wildlife Recovery Board; and American Rivers. Staff of local congressional representatives has also been invited. Reclamation and Ecology will work with the newly formed Work Group to prioritize projects for the legislative package for the Integrated Water Resource Management Alternative.

The work group will be convened for the first time on June 30, 2009. Reclamation and Ecology have established a target of no more than one year from the date of initiation for the work group to achieve consensus on the comprehensive water resource management implementation plan for the Yakima basin.

S.5.2 How Will the Comprehensive Water Resource Management Implementation be Funded?

The comprehensive water resource implementation planning process will be funded by Reclamation and Ecology. Actual implementation of the comprehensive plan will be funded through congressional authorization and funding, state legislative authorization and funding, and water user financial participation. Additional funding for some of the elements would come from grants and similar sources. Possible sources are summarized in Table S-1.

Table S-1. Potential Funding Sources for Elements of the Integrated Water Resource Management Alternative

Fish Passage	Modifying Existing Structures and Operations	New Storage	Ground Water Storage	Fish Habitat Enhancement	Enhanced Water Conservation	Market-based Reallocation of Water Resource
Congressional and/or legislative appropriation	Congressional and/or legislative appropriation Bonneville Power Administration	Congressional and/or legislative appropriation Columbia River Basin Water Supply Development Program Water users, including proratable irrigation districts	Municipalities Regional water purveyors	YRBWEP Bonneville Power Administration Yakama Nation Grants such as: Northwest Power and Conservation Council NOAA programs Salmon Recovery Funding Board	YRBWEP Reclamation programs Irrigation districts Individual irrigators Municipalities Washington Conservation Commission Salmon Recovery Funding Board Bonneville Power Administration Washington Department of Health	Ecology Water users Private conservation groups

S.5.3 Criteria for Prioritizing Projects

This EIS presents a number of projects for each of the elements of the Integrated Water Resource Management Alternative. As part of the comprehensive implementation plan, Reclamation, Ecology, and the Work Group will refine criteria for evaluating and prioritizing projects that will be included in the legislative package. The following criteria represent a starting point for the implementation plan.

Table S-2 Criteria for Evaluating Projects

Viability Criteria	Implementation Criteria
Technical Viability. Are there technical obstacles that would prevent the project from being constructed?	**Ability to Meet Goals.** Does the project meet the goals of the Integrated Water Resource Management Alternative?
Cost and Funding Sources. How expensive is the project and are there parties that are likely to be willing to accept the costs? Will funding sources be available, both in the short-term and long-term?	**Cost-effectiveness.** Of those projects that meet the objectives, which deliver the highest benefit per dollar invested?
Acceptability. Is the project broadly acceptable to the stakeholders in the Yakima basin?	**Timeliness.** How long will it take to implement the project?
Sustainability/Adaptability. Does the project improve the ability to adapt to climate change and other future changes?	**Permitting Ease.** What approvals or permits will be required? Is it likely that such permits and approvals could be secured within the project schedule and timelines?
Environmental Benefits. Does the project provide environmental benefits? Would the project create significant adverse impacts that cannot be effectively mitigated?	

S.6 Summary of Impacts and Mitigation

The probable significant adverse environmental impacts and proposed mitigation measures associated with the Integrated Water Resource Management Alternative are summarized in this section. These impacts and mitigation measures are discussed in greater detail in Chapter 4 (Short-term Impacts) and Chapter 5 (Long-term Impacts) of this Final EIS.

S.6.1 No Action Alternative

Under the No Action Alternative, Ecology would not propose any actions to improve water resources in the Yakima River basin. However, various agencies and other entities would continue to undertake individual actions to accomplish such improvements. These individual actions would result in impacts similar to the individual elements of the Integrated Water Resource Management Alternative described below.

Because the projects would not be undertaken as part of an integrated program, the actions would result in significantly less benefits to fish recovery. The continuing, competing demands on limited water resources, floodplain habitat, and riparian areas would continue to limit fish restoration and improvements to water supply without the synergy, speed of implementation, systematic effectiveness, and water management options provided by an integrated program of actions.

S.6.2 Integrated Water Resource Management Alternative

S.6.2.1 Short-term Impacts

Short-term impacts of the individual elements would be primarily related to construction activities.

Earth

Short-term construction that includes soil disturbing activities may result in erosion and sedimentation. Surface runoff from exposed soils could temporarily increase the turbidity in areas downstream of construction. The new storage element has the greatest potential for creating short-term earth impacts due to the scale of the potential projects and the length of construction that would be required. All short-term earth impacts would be temporary and localized, and are not expected to be significant. Site-specific geotechnical studies would facilitate identification of subsurface issues, unstable slopes, and other local factors that can contribute to slope instability and increase erosion potential. Other mitigation would include the use of construction best management practices (BMPs) and temporary erosion and sediment control (TESC) plans.

Climate

Projects can affect climate change by increasing carbon emissions (e.g., from construction vehicles and equipment) that contribute to global warming. The new storage element has the greatest potential for generating greenhouse emissions because of the duration and intensity of construction. Construction of a new reservoir or expanding an existing one could take three to four years, while construction activities for most other project elements would be complete within a few months. Emissions from construction vehicles could be reduced by following BMPs to minimize emissions, such as maintaining engines in good working order and minimizing trip distances. Potential impacts on climate change from construction activities would be analyzed separately when specific project details are available.

Surface Water

Because construction of project elements would take place in close proximity to water bodies, there is potential for increased sediment load. The elements that involve off-channel construction would have a lesser chance of increasing sediment load in downstream areas than those that are instream. Those elements that require the longest construction periods would have the greatest potential for sediment loading. Temporary reservoir draw downs may be required for the fish passage element and could temporarily affect downstream flows. Piping of irrigation laterals for projects under the modifying existing structures and the new storage elements may cause temporary disruptions in water supply for the areas the laterals serve if the construction is during an irrigation season. Potential impacts to surface water would be temporary and could be minimized with the use of construction BMPs, implementation of TESC plans, and by working cooperatively with fisheries agencies. These short-term impacts would not be considered significant.

Water Rights

The Integrated Water Resource Management Alternative is not expected to have any short-term impacts to water rights.

Ground Water

No ground water impacts are expected from construction activities related to the construction of new reservoirs or habitat restoration. Construction dewatering activities resulting from construction of fish passage elements or modification of existing structures may cause short-term reductions in ground water levels and availability in the alluvial or sedimentary aquifer systems. Construction for ground water storage facilities is not expected to extend to the ground water table and dewatering is not anticipated. All potential ground water impacts would be temporary and localized, and would not be considered significant. Site-specific hydrogeological studies would be conducted prior to construction to determine measures that would minimize potential short-term impacts.

Water Quality

There would be short-term impacts to water quality from instream and near-stream construction activities, such as soil disturbance; inadvertent release of fuel, oil, or other construction fluids; dewatering; and cast-in-place concrete work. Both sediment and contaminants can increase turbidity and affect other water quality parameters such as the amount of available oxygen in the water. Construction of new storage and ground water storage facilities could alter the interaction between surface water bodies and local ground water in systems where the two resources are hydrologically connected. Construction impacts would be temporary and localized, and could be minimized or prevented through the proper implementation of BMPs and TESC plans. Potential short-term impacts to water quality would not be considered significant.

Hydropower

The Integrated Water Resource Management Alternative is not expected to have any short-term impacts on hydropower.

Vegetation and Wildlife

Construction activities could result in the loss of vegetation and habitat. The construction of conduits, piping for irrigation channels, and new or expanded reservoir facilities associated with the fish passage and new storage elements could result in the loss of vegetation, including some second-growth forest areas. Any existing wildlife (birds, deer, elk, etc.) in the areas around construction activities would likely be temporarily displaced by the noise and construction activities. The fish habitat enhancement element would include restoration projects designed to replace and enhance native vegetation, and would also include the removal of non-native vegetation. Disturbed areas would be replanted with conifers and riparian vegetation, as appropriate, after construction is complete. The displacement of vegetation and wildlife in the vicinity of construction activities would be temporary. Short-term impacts to vegetation and wildlife would not be considered significant.

Fish and Aquatic Resources

Short-term impacts from construction activities associated with all of the elements would be temporary and localized, and could include dewatering of instream habitat, disturbance of juvenile salmonids, disturbance of shoreline habitat, increased water temperatures, sedimentation, fish passage obstruction, and potential for accidental spills of hazardous materials (i.e., cement, fuel, hydraulic fluid). Short-term impacts of the new storage element would likely be greater because there could be new construction and inundation of previously unimpounded areas of instream habitat. Typical mitigation for short-term fish and aquatic resource impacts may include such measures as deploying silt screens, using in-water containment screens to protect against accidental hazardous material spills, working within appropriate instream fish work windows, and maintaining fish passage through work areas.

Recreational Resources

Construction activities, heavy equipment, and temporary structures would be in evidence at varying intensities and durations during the construction period for individual projects. Access to and from some recreational facilities, such as parks, boat launches, trails, and campgrounds, may be limited during this time. Access to river banks for fishing, wildlife viewing, and other recreational activities could be limited during construction of fish habitat enhancement projects. Short-term recreational impacts would be directly related to the duration of and the proximity to construction activities. Potential impacts to recreational resources associated with construction of any of the project elements would be short-term, minor, localized, and temporary, and are not expected to be significant. To the extent possible, alternate access routes would be provided. To minimize the negative impact to users, informational signage and alternate directions should be posted along access routes, at the recreational sites, and on agency websites.

Land and Shoreline Use

Construction activities, heavy equipment, and temporary structures could limit access to and from adjacent properties. Construction activities for new storage, such as for the lateral piping projects, could be larger in scale than for the other elements; thus, impacts to access adjacent properties could last longer, but would still be temporary in nature. To minimize negative impacts, informational signage and alternate directions should be posted along access routes, at the construction sites, and on agency websites. Potential impacts to land use associated with the construction of most project elements would be temporary and localized to the properties in the immediate vicinity of the project, and are not expected to be significant.

Cultural Resources

Any ground disturbing activity, including removal of vegetation prior to inundation, earthmoving, and use of heavy equipment, could adversely affect cultural resources in the area of construction activities, as well as in staging areas and construction access areas, for any of the project elements. Additionally, construction could adversely impact access to traditional cultural properties, traditional use areas, and sacred sites. Under any of the alternatives, additional environmental review is expected to be conducted and appropriate mitigation would be determined at that time.

Socioeconomics

Some of the individual project elements might have discernible short-term effects on the supply and value of some goods and services derived from the basin's water-related ecosystem. Project-related expenditures likely would have short-term impacts on jobs and incomes, and project-related activities might trigger short-term changes in uncertainty and risk. The type and level of mitigation, if any, that would be appropriate for adverse, short-term socioeconomic impacts would be determined by future socioeconomic conditions and by the specific steps that would be taken to implement the projects. These potential impacts are not expected to be significant.

Visual Resources

Construction activities, fugitive dust, heavy equipment, cofferdams, and other temporary structures would be in evidence at varying intensities and durations during the construction period for individual projects. Because storage projects, such as Bumping Lake, might be located in popular recreation areas, and because of the length of construction required, visual impacts during construction could be significant. Potential visual impacts associated with construction of all other project elements would be short-term, minor, localized, and temporary.

Transportation

Construction of the various project elements could have minor, short-term impacts on highways in the Yakima River basin. The degree of impact depends, in part, on the current level of service on potentially affected roads. Only minor short-term impacts are anticipated for all of the project elements except for new storage. Construction of a new reservoir, such as Bumping Lake, could cause road closures during the construction period, which could last several years. Mitigation measures to reduce short-term construction impacts to transportation would include maintaining access to properties, installing signage, marking detour routes, and providing information to the public.

S.6.2.2 Long-term Impacts

Earth

The new storage facilities element has the greatest potential to cause impacts to earth resources over the long term. Storage facilities, including the expansion of Bumping Lake, have the potential to alter the transport of upstream sediments, resulting in increased deposition in the reservoir and reduced sediment loads to downstream waters. No major long-term earth impacts are expected from the other project elements. Mitigation measures to reduce sedimentation could be accomplished through roadway design, stream buffers, and compliance with state stormwater requirements.

Climate

The Integrated Water Resource Management Alternative would not significantly increase emissions in the long term that could affect climate change. There would be minor increases in vehicle emissions caused by trips to service new facilities. The effects of climate change are expected to alter temperature and precipitation in the Yakima River basin and affect water management throughout the region. These changes would affect the amount and timing of runoff into the basin's storage reservoirs. The Integrated Water Resource Management Alternative would provide multiple benefits to water supply, agriculture and fish while providing water managers with more tools and increased flexibility to adapt to future climate changes. Ecology and Reclamation would coordinate with other water, fish, agriculture, energy, forestry and public health managers to adapt to climate change.

Surface Water

The Integrated Water Resource Management Alternative would provide benefits to water supplies for irrigated agriculture and municipal needs and would improve stream flow conditions for fish. These benefits would be provided throughout the Yakima River basin. Water supply conditions would improve for proratable water users. Additional water would be provided for stream flows to benefit fish during critical flow periods. The alternative could improve flow in tributaries to the Yakima and Naches Rivers such as Big Creek, Little Creek, Taneum Creek, Manastash Creek, Teanaway River, Swauk Creek, Cowiche Creek, Ahtanum Creek, Toppenish and Satus Creek. Mainstem river reaches could benefit from increased storage and revised operations. Those benefits would include providing additional flow in the Yakima, Cle Elum, Bumping, and Naches Rivers in spring months; providing pulse flow in those same rivers as desired; increasing winter flows in the Cle Elum River, and increasing flow in the Yakima River in summer months downstream of the Sunnyside Canal diversion.

Water Rights

Operational changes at the power generation facilities at Roza Dam and Chandler Power Plant have the potential to cause long-term impacts to Reclamation's ability to fully exercise its water rights for power production. The impacts to proratable water rights from new storage options would be positive. Because no new water rights may be issued or changes to water rights may be approved that would impair existing rights, the Integrated Water Resource Management Alternative should not have negative impacts on water rights.

Ground Water

No long-term impacts on ground water are expected from the operation of constructed fish passage facilities. Ground water levels and quantity are expected to increase through additional recharge from storage facilities, riparian enhancements, wetland and wet meadow construction, and from floodplain enhancements. Some localized decreases in recharge are expected from improving conveyance facilities. Ground water storage would include changes in the level, gradient, recharge and discharge rates of ground water in the vicinity of the storage facilities. For all elements, the timing of operational activities could be used to reduce the potential impacts to ground water. None of the impacts to ground water would be considered significant.

Water Quality

The Integrated Water Resource Management would have generally positive effects on water quality as a result of improving stream flows and riparian conditions. Fish passage facilities could increase the delivery of organic debris, sediment, and nutrient to downstream waters and modifications to existing storage or new storage facilities could alter stream temperatures and dissolved oxygen (DO) concentrations. However, it is expected that these facilities would be designed and managed to minimize these impacts. Riparian and wetland habitat enhancements would help remove instream contaminants and cool the water.

Hydropower

Implementing the elements under the Integrated Water Resource Management Alternative as an integrated package would result in a combination of effects including a reduction of hydroelectric generation at the Roza and Chandler Power Plants and at the two in-line power plants in the WIP. A slight reduction in hydroelectric generation at dams along the Columbia River would occur when a new reservoir is refilling after the irrigation portion of the water stored is used during a drought year. Additional demand for electricity would occur from some elements of the Integrated Water Resource Management Alternative, including a large pump station to feed Wymer reservoir. The combination of energy recovery at Roza Dam and generation due to improved flows in the Yakima River may offset any impacts from pumping at Thorp and subordination at Roza Dam. If a hydroelectric generation facility is feasible at the new reservoir sites, then the overall effect may be an offset of pumping costs and possibly an increase in hydroelectric generation.

Vegetation and Wildlife

Construction of new facilities for fish passage, storage, or ground water storage could result in permanent removal of vegetation and displacement of wildlife. Some critical habitat could be removed. Construction of new storage facilities has the greatest potential for impacts to vegetation and wildlife. No impacts to plants and wildlife are anticipated with modification of existing structures and operations. The proposed fish habitat protection, restoration, and enhancement projects would improve native plant diversity and habitat for wildlife. The impacts to vegetation and wildlife caused by the development of the required facilities and infrastructure would be mitigated through site and facility design to minimize the need for vegetation removal, and areas will be revegetated wherever possible.

Fish and Aquatic Resources

Long-term impacts to fish and aquatic resources are expected to be positive. Exceptions would be possible impacts to bull trout and resident fish, and changes to flows associated with new or expanded reservoirs, especially in the Naches River basin. This impact would be mitigated to the extent possible through design and operation of the facilities. The integrated elements would address many in-basin factors that currently limit the restoration of sustainable fish populations in the Yakima River basin by improving fish passage, restoring fish passage into historically occupied habitat upstream of reservoir dams, enhancing fish habitat, and improving stream flows by modifying structures and operations and providing new storage. Fish populations would benefit more from an integrated approach that combines all the elements of the Integrated Water Resource Management Alternative than they would through individual projects.

Recreational Resources

Long-term impacts would be primarily related to activities that may result in the loss of some property used for recreational purposes, and in management and operational changes that alter the flow regime of the systems within the Yakima River basin. Fish passage and habitat enhancement projects would be designed to increase overall habitat area and fish survival rates within the affected reaches, which could be a long-term beneficial impact on recreational fishing opportunities. Some new storage options could eliminate recreational facilities and cause significant impacts to recreation. This would be mitigated to the extent possible by the creation of new facilities and recreational opportunities over time.

Land and Shoreline Use

Some of the proposed projects would require acquisitions of land or easements, such as for the lateral piping projects, new storage options, ground water storage and habitat enhancements, which may constitute a change in land use. If individual projects are chosen that require the acquisition of land, appropriate compensation would be required in accordance with applicable state or federal regulations. Potential long-term impacts to land use would not be considered significant.

Cultural Resources

The long-term impacts to buried cultural resources from an integrated approach to water supply and fish habitat improvements would largely be related to operation of new facilities or changed water drainage patterns (such as meandering channels, increased/decreased flow). The main long-term impact for most elements would be erosion of cultural deposits, but could also result through inundation, chemical weathering, vandalism/artifact collecting, and land development. The actual process to be followed to mitigate adverse effects would be determined by the regulatory nexus for the project element. It is anticipated that most large projects would require compliance with Section 106.

Socioeconomics

The various elements of the Integrated Water Resource Management Alternative would affect the socioeconomic characteristics of the Yakima River basin and the region. Projects that improve fish passage and habitat would likely increase the long-term value of goods and services. Fish passage and new storage projects could increase jobs and incomes. The projects would reduce the risk to agriculture by improving water supply and reducing the likelihood of prorationing. The projects would also reduce the uncertainty and risk associated with salmonid populations by diminishing the likelihood of severe future reductions in fish populations. For all projects, the long-term costs and benefits would not be distributed equally. For many projects, the majority of costs would be borne by taxpayers, and benefits would be realized by those who experience an increase in goods or services: irrigators who would realize the benefits of an increase in the reliability of water supplies; anglers who would realize the benefits of improved fishing opportunities; or citizens who would realize the benefits from healthier, more robust ecosystems, for example. However, municipalities would pay the full share of projects to improve municipal water supplies and irrigators would pay a portion of conservation or storage projects. The elements would boost the sectors of the economy that would enjoy increased supply of specific goods and services relative to those that would not. For example, new storage would affect the agricultural sector by providing a more reliable water supply.

Visual Resources

At viewpoints above the dams, and on or adjacent to reservoirs, new project elements, such as additional intake structures and conduits for fish passage, may be visible. For the most part, new facilities would be introduced into a visual environment already containing several similar facilities, though some impacts would be locally significant. Construction of new storage and ground water storage facilities would result in significant long-term visual impacts. Habitat enhancements, including levee setbacks and riparian plantings, would have beneficial impacts on views. New or modified canals, ditches, tunnels, siphons, and appurtenant facilities would be located to minimize their visibility from public areas.

Transportation

No significant long-term impacts to transportation are anticipated from any of the project elements. No mitigation would be necessary.

S.7 Project Phasing and Schedule of Future Environmental Review

This programmatic EIS has been prepared to generally address probable significant adverse impacts associated with implementation of the elements of the Integrated Water Resource Management Alternative. This EIS has been prepared in accordance with SEPA and discusses actions subject to SEPA review. The SEPA review of the Integrated Water Resource Management Alternative is completed with this Final EIS.

Specific projects will be identified as part of the comprehensive water resource management implementation plan. Projects identified for implementation through that process will require additional environmental review when they are carried forward. These projects may require additional SEPA compliance, National Environmental Policy Act (NEPA) compliance, or both, depending upon the implementing agency, source of funding, and/or types of permits required. Projects will be evaluated as they are developed and ready for environmental review; this could occur within the next few years or as long as several years in the future for more involved projects.

Table S-3 summarizes the anticipated future review of the elements of the Integrated Water Resource Management Alternative. In addition to the SEPA and NEPA compliance summarized in the table, the projects will comply with all applicable federal, state, and local regulations.

Table S-3. Future Environmental Review for Elements of the Integrated Water Resource Management Alternative

Element of the Integrated Water Resource Management Alternative	Future Environmental Review	Comments
Fish Passage	SEPA and NEPA review Likely SEPA lead agency: Ecology Likely NEPA lead agency: Reclamation	Environmental documentation would likely be an EIS under both NEPA and/or SEPA. Congressional authorization and appropriation may be required. Combined NEPA/SEPA EIS has begun for fish passage at Cle Elum Lake.
Modifying Existing Structures or Operations	SEPA and NEPA review Likely SEPA lead agency: Ecology Likely NEPA lead agency: Reclamation	Environmental documentation would likely be a NEPA EA and/or SEPA Checklist.
New Storage	SEPA and NEPA review Likely SEPA lead agency: Ecology Likely NEPA lead agency: Reclamation	Environmental documentation would likely be an EIS under both NEPA and/or SEPA. Congressional authorization and appropriation may be required.
Ground Water Storage	SEPA review Likely SEPA lead agency: Ecology, local city/county or utility with SEPA lead agency status	
Fish Habitat Enhancement	SEPA review Likely SEPA lead agency: Ecology or WDFW Possible NEPA review depending on funding	Environmental documentation would likely be a SEPA Checklist or NEPA EA if federal funding is involved.
Enhanced Water Conservation	SEPA and/or NEPA review Likely SEPA lead agency: Conservation Districts, Irrigation Districts with SEPA authority Likely NEPA lead agency: Reclamation	Level of environmental review would depend on the nature of improvements proposed. Minor changes would likely fall below SEPA and/or NEPA thresholds of significance.
Market-based Reallocation of Water Resources	SEPA review Likely SEPA lead agency: Ecology	SEPA threshold would be determined by Ecology.

S.8 Areas of Significant Controversy and Uncertainty

There are several areas of uncertainty associated with the Integrated Water Resource Management Alternative, in part because specific projects to implement the alternative have not been proposed. Potential impacts and benefits have been evaluated at a programmatic level. This Final EIS is intended to provide a frame work for Reclamation, Ecology and the work group as they develop the comprehensive water resource management implementation plan. This Final EIS provides an analysis of impacts that is conceptual in nature. The conceptual analysis indicates the general range of impacts that would be associated with elements included in the Integrated Water Resource Management Alternative. When specific projects are proposed as part of the comprehensive water resource management implementation plan, additional environmental review would be conducted. That additional review is expected to resolve some of the uncertainties associated with the impacts of the elements of the Integrated Water Resource Management Alternative.

Several potential storage sites have been proposed as part of the alternative. The technical and economic feasibility of the sites is not completely known at this time. Reclamation and Ecology will continue to evaluate the viability of the sites if storage projects are selected as an element to resolve water resource problems in the Yakima River basin.

A major area of controversy associated with the Integrated Water Resource Management Alternative is the ongoing debate about the construction and operation of reservoirs. Typically the construction of a reservoir is accompanied by controversy with some people opposed to any reservoir construction. Controversy has been associated with past proposals to expand Bumping Lake. Land acquisition for a new reservoir and the commitment of land and existing beneficial uses to a storage reservoir would likely continue to be areas of controversy.

CHAPTER 1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

The Washington State Department of Ecology (Ecology) is facilitating the development of a program for an integrated approach to improve water supply for irrigated agriculture and future municipal needs in the Yakima River basin in coordination with habitat improvements for anadromous and resident fish. The integrated approach incorporates a variety of elements that could address multiple facets of water resource problems in the Yakima River basin. Ecology is working with the U.S. Bureau of Reclamation (Reclamation) and other water interests in the basin to implement the integrated approach to improve water resources as the third and final phase of the Yakima River Basin Water Enhancement Project (YRBWEP).

In January 2008, Ecology and Reclamation released a Draft Planning Report/ Environmental Impact Statement (EIS) for the Yakima River Basin Water Storage Feasibility Study that evaluated opportunities for water storage in the basin. Ecology and Reclamation received comments on the document stating that it had not considered a sufficiently wide range of alternatives and that the alternatives should include an integrated approach to benefit all resources including fish passage and habitat improvements in addition to improved storage. In response to those comments, Ecology prepared a separate SEPA Supplemental Draft EIS that presented an alternative that proposed additional storage options integrated with fish habitat and passage improvements. This alternative was named the "Integrated Water Resource Management Alternative." The Supplemental Draft EIS was released December 10, 2008. This Final EIS incorporates the alternatives proposed in the January 2008 Draft Planning Report/EIS—enhanced water conservation, ground water storage and market-based reallocation of water resources—into the Integrated Water Resource Management Alternative. This Final EIS also responds to comments on the January 2008 Draft Planning Report/EIS and the December 2008 Supplemental Draft EIS.

1.2 Purpose and Objectives

The Yakima River basin is affected by a variety of water resource problems that affect agriculture, anadromous and resident fish, and municipal and domestic water supply. Factors contributing to water resource problems in the basin include:

- Demand for irrigation water cannot always be met in years with below average runoff, leading to reduced (prorationed) irrigation water for junior water rights holders in drought years;
- In dry years, farming and related income are reduced;
- Dams and other obstructions block fish passage to upstream tributaries and spawning grounds;

- Diking, channelization, wetland draining, gravel mining, and road construction have prevented proper floodplain functions;
- Riparian habitat has been degraded by past and present land use practices;
- In most years, spring flows in the middle and lower Yakima River are not sufficient to optimize the survival of out-migrating smolts;
- In most years, summer flows in the Wapato reach and immediately downstream from Prosser Diversion Dam to Chandler Power Plant are too low to maintain salmonid passage and riparian function;
- Unnaturally high summer flows persist in the upper Yakima and Cle Elum Rivers, impacting rearing habitat for juvenile salmonids;
- The annual late summer river operation disrupts salmonid habitat and has negative impacts to aquatic insect populations;
- Winter flows in the upper Yakima and Cle Elum Rivers are low and controlled for water storage, potentially impacting the survival of over-wintering juvenile salmonids;
- Water rights in most of the basin are fully appropriated, making it difficult to acquire water rights to meet future municipal and domestic water demand;
- Pumping ground water for irrigation and municipal uses may reduce surface water flows in some locations, which may affect existing water rights; and
- The potential for hydraulic continuity between ground water and surface water in the basin creates uncertainty over the status of ground water rights and exempt wells within the basin's appropriative water rights system (first in time first in right), potentially making ground water use junior to nearly all surface water use.

The specific objectives of the December 2008 Supplemental Draft EIS and this Final EIS are to (1) provide water for irrigated agriculture and future municipal needs and improve habitat for anadromous and resident fish. The Integrated Water Resource Management Alternative is an integrated package of elements to meet those three objectives and help resolve water resource problems in the Yakima River basin.

The purpose of an integrated approach to resolving water problems is to provide both environmental and economic sustainability in the basin. The integrated approach seeks least cost, long-term solutions to both water supply and environmental problems in the basin. The integrated approach is intended to protect the reliability of water supply in the long term, while reducing conflicts between water supply and fish needs.

1.3 Background

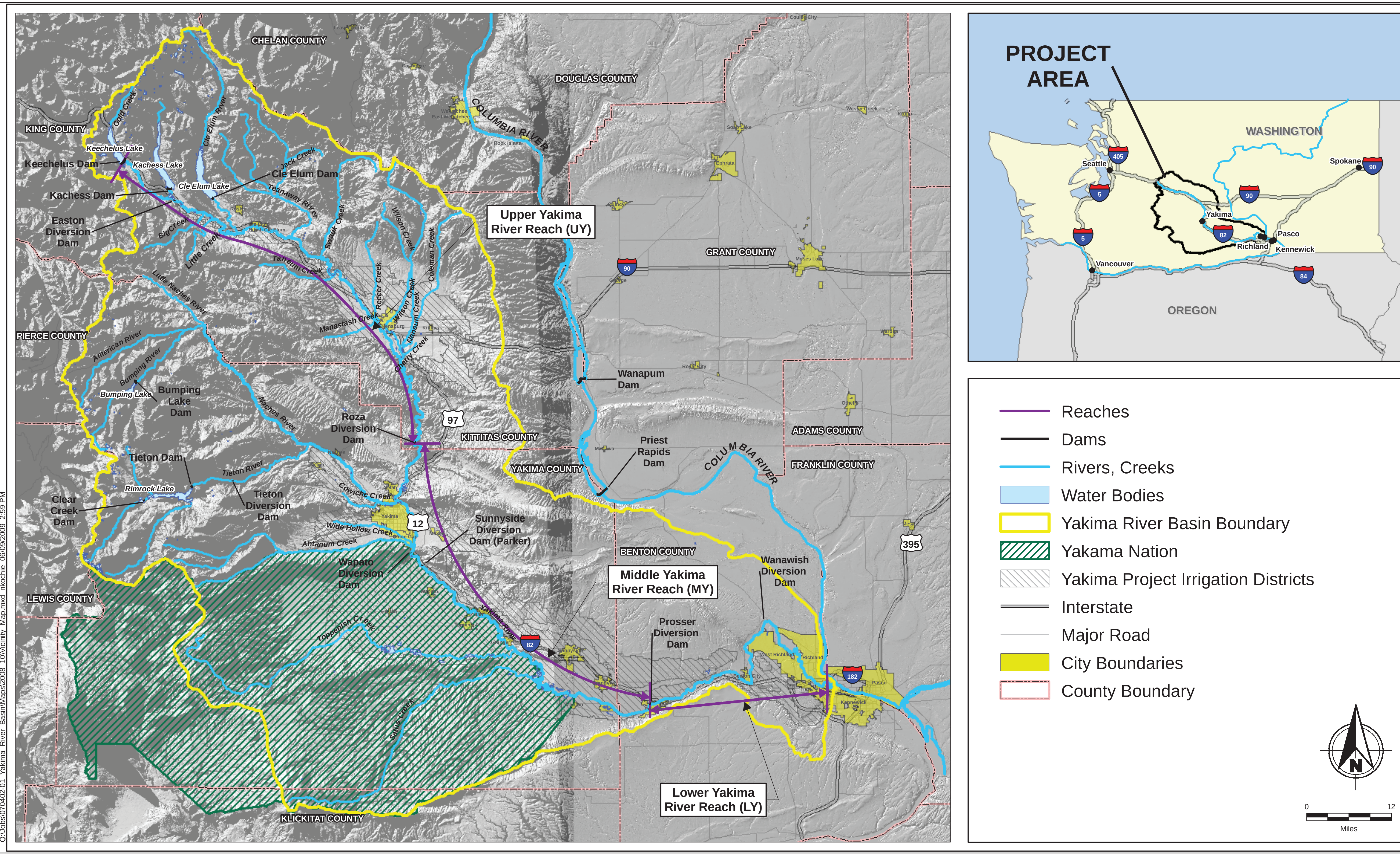
This section provides background information for the need to develop an integrated approach to resolving water management problems in the Yakima River basin. This section briefly describes the major water resource issues in the basin, past or ongoing efforts to address the problems, and steps that are needed to improve conditions.

1.3.1 Water Resource Problems in the Yakima River Basin

Approximately 120,000 acres were already being irrigated by natural flows in the Yakima River basin when Reclamation began investigations in 1903 to develop a more dependable water supply for irrigation. Reclamation's Yakima Project includes five major storage reservoirs in the upper Yakima and Naches River basins—Keechelus, Kachess, Cle Elum, Tieton, and Bumping (Figure 1-1). The first storage project of Reclamation's Yakima Project, Bumping Lake, was completed in 1910 and the last project, Cle Elum, was completed in 1933. The reservoirs store approximately 1 million acre-feet of water, which represents only 30 percent of the annual runoff in the basin. Reclamation has contracts to supply more than 1.7 million acre-feet of water and therefore has problems delivering adequate water to its users in low water years. The shortage of water results in prorationing of water to junior water users under provisions of a 1945 court order (see Section 1.6.3 of the January 2008 Draft Planning Report/EIS). Water shortages have impacted the basin's agriculture-based economy and the uncertainty of the water supply for proratable water users affect decisions on planting higher value crops, which in turn reduces farm and non-farm income.

Approximately 450,000 acres are currently irrigated from the Yakima Project (Figure 1-2). This irrigation has enabled the production of high value orchard crops, wine grapes, and hops in addition to grains, vegetables, and dairy products. Irrigation has created a solid agricultural economy in the basin which has been called "one of the most productive agricultural areas in the West" (Natural Resources Law Center, 1996).

The Yakima River basin historically supported large runs of anadromous salmonids. Estimates of anadromous salmonid fish runs in the Yakima River basin in the 1880s range from 300,000 to 960,000 fish each year (Natural Resource Law Center, 1996).



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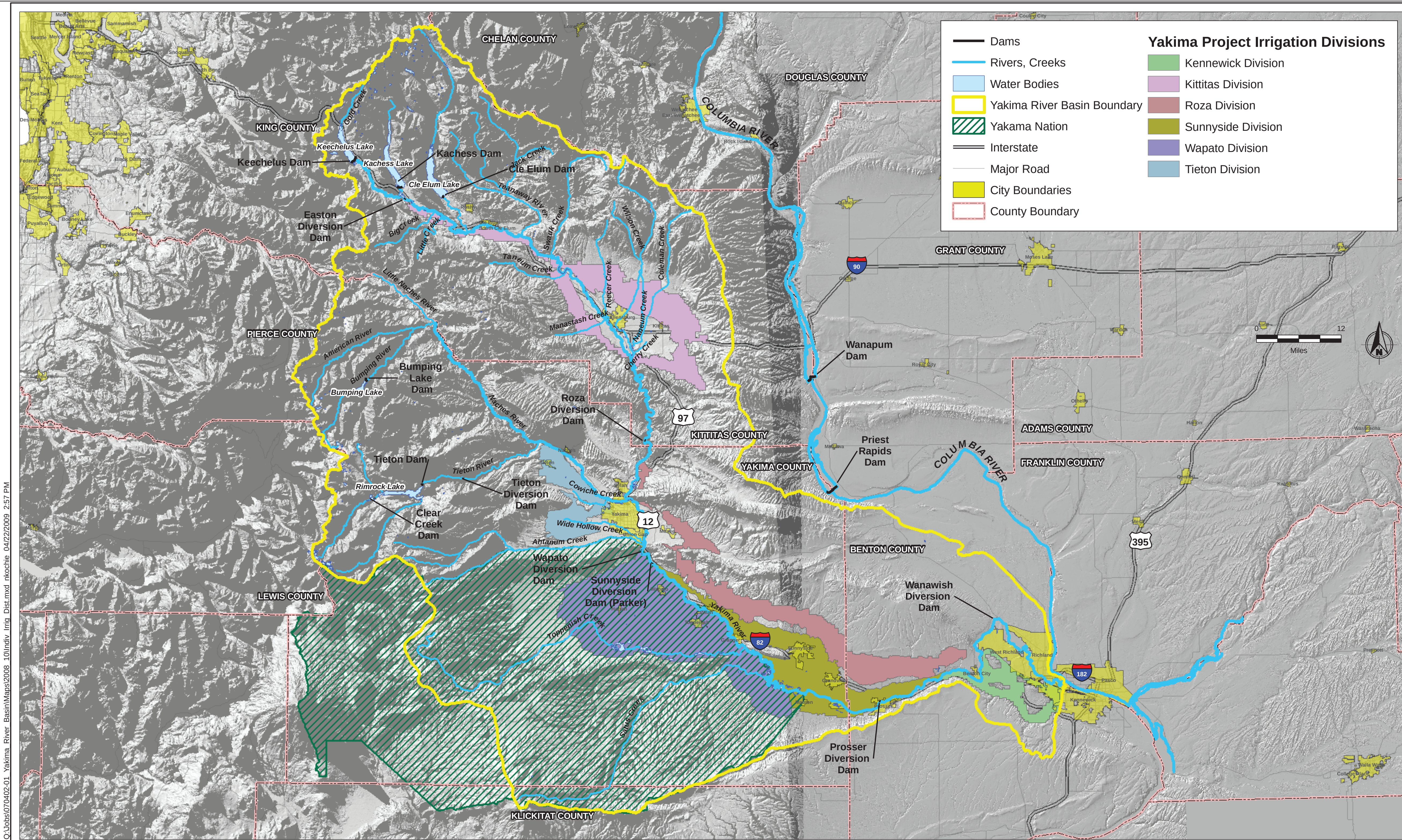
SOURCE: Anchor Environmental, 2009.

Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure 1-1
Yakima River Basin Map
Washington



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SOURCE: Anchor Environmental, 2009.

Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure 1-2
Yakima Project Irrigation Divisions
Washington

Pre-European settlement estimates of returning steelhead salmon alone (a subset of the total basin fish population) range from 20,800 to 100,000 (YBFWRB, 2008). Between 1981 and 1990, the average annual return of all anadromous salmonids to the Yakima River was only 8,000. For the period from 1998 to 2007 the following counts were recorded:

- Combined Chinook past Prosser: 3,051 to 25,783[1];
- Coho: 818 to 6,216;
- Steelhead: 1,070 to 4,525 (YKFP, 2009; Columbia River DART, 2009).

The construction of crib dams at the four natural glacial lakes contributed to the extirpation of sockeye salmon from the basin in the early 1990s. Later construction by Reclamation of larger storage dams over the four crib dams and a fifth new dam (on the Tieton River) eliminated access to previously productive spawning and rearing habitat for spring Chinook salmon, coho salmon, and steelhead, and resident fish populations—especially bull trout—that are now isolated but were formerly interconnected. Native summer Chinook and coho have also been extirpated (coho were reintroduced in the 1980s) and the numbers of spring and fall Chinook and summer steelhead have been seriously reduced. In response to declining fish numbers, steelhead were listed as threatened under the Endangered Species Act (ESA) in 1999. Some resident fish have fared little better, with bull trout listed as threatened in 1998.

Residential development and population have been increasing in the Yakima River basin in the last two decades, especially around Ellensburg, Yakima, and the Tri-Cities. Resort and second home developments have also increased in the areas around Cle Elum and Roslyn. Because water rights are fully appropriated in most areas of the Yakima basin, acquiring water rights for expanding municipalities and for housing developments is often difficult. Many of the housing developments rely on exempt wells for domestic water supplies. In recent years, there has been increased pressure to reduce growth of the number of exempt wells.

1.3.2 What's Been Done

Numerous studies and programs have been undertaken to attempt to resolve water resource issues in the Yakima River basin. These include studies to develop additional water storage and proposals to restore resident and anadromous fish habitat and population. Additional information on the programs described here is provided in Section 1.7 of the January 2008 Draft Planning Report/EIS.

From the late 1960s to the mid 1980s, a major focus of providing additional storage in the basin was expansion of Bumping Lake. Reclamation studied the expansion in the 1970s and bills to authorize construction were introduced in Congress, but Congress did not

[1] Counts are past Prosser and do not represent a total count for fall Chinook.

take action on them. In 1979, Congress authorized and provided funds for the Yakima River Basin Water Enhancement Project (YRBWEP) which included an evaluation of storage sites in the basin and nonstorage elements such as installation of fish ladders and screens. These projects are referred to as Phase I of YRBWEP. Starting in the late 1990s, the focus of storage in the basin shifted to Black Rock reservoir, which was evaluated in the January 2008 Draft Planning Report/EIS and December 2008 Final Planning Report/EIS.

In response to increased interest in finding nonstorage solutions to water management issues in the basin, Congress authorized Phase II of YRBWEP in 1994. Actions that have been undertaken as part of Phase II include a voluntary water conservation program and the establishment of target flows on the Yakima River.

Several basin-wide planning efforts have been undertaken in the basin. The Yakima River Watershed Council developed a draft plan for water management in the basin in 1997, but discontinued its efforts when the state initiated a new watershed planning effort. Under state legislation enacted in 1998, the Yakima River Basin Watershed Planning Unit developed a watershed plan in 2003.[2] The plan addresses water supply for irrigation, municipal and domestic uses, and fish habitat.

The Northwest Power and Conservation Council developed the Yakima Subbasin Plan in 2004 to identify projects for funding under Bonneville Power Administration's (BPA) program for the protection, restoration, and enhancement of fish and wildlife.[3] The Subbasin Plan identifies a number of specific fish enhancement projects, some of which have been or are being implemented.

The Yakima Basin Fish and Wildlife Recovery Board developed the Yakima Steelhead Recovery Plan in 2007.[4] This plan outlines projects that are needed to recover steelhead in the Yakima River basin that are listed under the ESA.

Reclamation has studied the feasibility of installing fish passage at Cle Elum and Bumping Dams and is currently preparing a combined NEPA/SEPA EIS with Ecology on fish passage and fish reintroduction at Cle Elum Dam.

Various projects have been implemented under these and other programs and plans, including water conservation, habitat improvements, and fish supplementation (hatcheries). Target flows have improved stream flows on the Yakima River below Sunnyside and Prosser Dams. The System Operations Advisory Committee (SOAC) process has improved flows below the reservoirs in winter. Fish passage has been improved on the mainstem and irrigation diversions have been screened. The basin-wide plans have provided the background to identify specific projects for habitat restoration and have been used to secure funding for projects from the state Salmon Recovery Funding Board, BPA, and other funding sources.

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[2] Available at: http://www.yakimacounty.us/ybwra/Watershed/watershedplan.htm.
[3] Available at: http://www.nwcouncil.org/fw/subbasinplanning/yakima/plan/
[4] Available at: http://www.ybfwrb.org/RecoveryPlan/8-18-08%20Yakima%20Steelhead%20Recovery%20Plan.pdf

1.3.3 What Still Needs to be Done

The efforts described above have resulted in an increase in instream habitat complexity and improved access to fish habitat. Changes in river management, habitat improvements and the Yakima/Klickitat Fisheries Project hatchery program have all contributed to improvements in spring Chinook abundance and reintroduction of coho in the basin. Federal ESA regulations have led to efforts to monitor and evaluate the productivity, abundance, and survival of adult and juvenile steelhead and bull trout in the Yakima basin. The number of returning steelhead has increased in recent years; however, "even the more recent estimates of steelhead abundance are at least an order of magnitude less than even the low to middle range of estimates of historic abundance" (YBFWRB, 2008).

In spite of the significant past efforts, there are still unscreened irrigation diversions, instream flow limitations, passage barriers, and habitat challenges limiting salmonid distribution and survival in the Yakima basin (Myra and Ready, 2008). In addition to habitat enhancements, both anadromous and resident fish would benefit from improved stream flows and fish passage (YBFWRB, 2008**)**. Maintaining adequate instream flows year-round is critical to recovering sustainable salmonid populations in the Yakima basin.

Water shortages continue for proratable irrigators during low water years. In recent droughts, some districts have experienced proration as low as 38 percent. Water shortages are predicted to become more frequent under changing climate conditions. There are increasing conflicts, especially in the upper basin over water supplies for domestic purposes. Water conservation programs have been implemented in most irrigation districts and more are planned; however, conservation alone is not expected to provide enough water to relieve prorationing. Water marketing has been used to some extent in the basin, primarily to provide instream flows and domestic water, but there is not active water market system.

The ongoing water problems in the basin have suggested that none of the problems can be resolved with isolated projects that address only irrigation supply or fish habitat enhancement. Water and fisheries managers have called for a comprehensive, integrated program that provides water for irrigated agriculture, future municipal needs, and habitat and passage improvements for anadromous and resident fish (see comment letters on the Draft Planning Report/EIS and the Draft Supplemental EIS in Chapter 6 of this document). In addition to providing improved flow conditions, it is necessary to provide enhanced habitat access and quality to increase fish production in the Yakima River basin. The Integrated Water Resource Management Alternative presented in this EIS identifies potential components of such an integrated approach. The alternative builds on past planning efforts to identify approaches needed to resolve water problems in the Yakima River basin.

1.4 January 2008 Draft Planning Report and EIS

In 2003, Congress directed the Bureau of Reclamation to conduct a feasibility study of options for additional water storage in the Yakima River basin. The authorization for the study is contained in Section 214 of the Act of February 20, 2003 (Public Law 108-7). The authorization states that the study will place "… emphasis on the feasibility of storage of Columbia River water in the potential Black Rock Reservoir and the benefit of additional storage to endangered and threatened fish, irrigated agriculture, and municipal water supply."

Reclamation initiated the development of the Yakima River Basin Water Storage Feasibility Study (Storage Study) in May 2003. The state of Washington joined Reclamation in that effort after funding was provided in the state's 2003-2005 capital budget. Funding was allocated to Ecology to be used "… solely for expenditure under a contract between Ecology and the United States Bureau of Reclamation for the development of plans, engineering, and financing reports and other preconstruction activities associated with the development of water storage projects in the Yakima River basin, consistent with the Yakima River Basin Water Enhancement Project, PL 103-434. The initial water storage feasibility study shall be for the Black Rock Reservoir project." Since this initial appropriation, the state has provided additional 50-50 percent matching funds for the Storage Study.

In 2007, Reclamation and Ecology initiated environmental review for the Storage Study. Environmental review was conducted under two separate authorities: Reclamation's authority under the National Environmental Policy Act (NEPA) and the Ecology's authority under the State Environmental Policy Act (SEPA). The Draft Planning Report and Environmental Impact Statement (EIS) for the Storage Study was prepared as a combined NEPA and SEPA document, entitled the *Yakima River Basin Water Storage Feasibility Study Draft Planning Report/EIS* (Reclamation and Ecology, 2008). (This document is referred to as the January 2008 Draft Planning Report/EIS throughout this Final EIS.)

Reclamation believed that the congressional authorization for the Storage Study limited the range of alternatives that it could consider in the EIS to the Black Rock reservoir and other potential storage facilities in the Yakima River basin. The alternatives considered by Reclamation were:

- No Action Alternative;
- Black Rock Reservoir Alternative;
- Wymer Dam and Reservoir Alternative; and
- Wymer Dam Plus Yakima River Pump Exchange Alternative.

Ecology concurred with those alternatives; thus, they were referred to as the "Joint Alternatives" in the January 2008 Draft Planning Report/EIS. However, Ecology felt that its obligation to evaluate "reasonable alternatives" under SEPA required the department to evaluate more than in-basin storage facilities included in the Joint Alternatives. Ecology determined that both storage and non-storage means of achieving the congressional objectives needed to be evaluated. Thus, the January 2008 Draft Planning Report/EIS considered three "State Alternatives" in addition to the Joint Alternatives:

- Enhanced Water Conservation Alternative;
- Market-Based Reallocation of Water Resources Alternative; and
- Ground Water Storage Alternative.

Reclamation and Ecology held a public comment period on the January 2008 Draft Planning Report/EIS from January 29 to March 31, 2008. A number of the comments received asserted that Reclamation and Ecology had failed to evaluate an adequate range of reasonable alternatives, and that the alternatives that had been evaluated were analyzed outside of the context of fish habitat and passage needs for the Yakima River basin. Ecology consulted with Reclamation concerning whether additional alternatives should be evaluated. Ecology concluded that the scope of the EIS should be expanded; however, Reclamation determined that its congressional authorization precluded it from expanding its analysis under NEPA. Therefore, Ecology decided to separate from the joint NEPA/SEPA process for the study and to pursue completion of a stand-alone SEPA EIS. Ecology continued to act as a cooperating agency for Reclamation's NEPA process while Reclamation acted in a similar capacity for the SEPA process. Reclamation pursued completion of the Final Planning Report/EIS for the Storage Study, while Ecology prepared a SEPA Supplemental Draft EIS and this Final EIS.

1.5 December 2008 Final Planning Report/EIS

Reclamation released its Final Planning Report/EIS on December 29, 2008. The Final Planning Report/EIS included only the Joint Alternatives and responses to comments on the Joint Alternatives. The Final Planning Report/EIS concluded that none of the action alternatives evaluated met federal criteria for an economically and environmentally sound water project and recommended the No Action Alternative as the preferred alternative. On April 3, 2009, Reclamation announced that it had terminated the Yakima River Basin Water Storage Feasibility Study.

A brief summary of the findings of the Final Planning Report/EIS is presented below. The Final Planning Report/EIS should be consulted for details on the environmental analysis.

The Final Planning Report/EIS determined that the Black Rock Reservoir Alternative would have the following major benefits and impacts:

- Add 1.3 million acre-feet of active storage capacity to the basin;
- Meet the dry-year proratable irrigation water supply goal in all years;
- Meet municipal water supply needs;
- Increase stream flows in the Yakima River in all seasons;
- Provide increased stream flows in the Yakima River which would generally benefit anadromous fish;

- Increase anadromous fish stocks by 21 to 61 percent and steelhead stocks by 51 percent;
- Cause ground water to seep toward and through the Hanford Nuclear Reservation, increasing ground water flow and complicating cleanup efforts at the site, although Reclamation concluded that the seepage could be intercepted;
- Have no negative impacts on water quality in the Columbia or Yakima Rivers if seepage toward the Hanford Site were intercepted;
- Inundate approximately 3,850 acres of shrub-steppe habitat and affect sage grouse populations;
- Require the acquisition of 13,000 acres of private property and the relocation of a state highway;
- Alter habitat conditions in the Arid Lands Ecology Reserve through construction of seepage mitigation features;
- Cost $7.73 billion with annual operating costs of $60.2 million ($50 million for energy pumping); and
- Have a benefit-cost ratio of 0.13.

The Wymer Dam and Reservoir Alternative would have the following major benefits and impacts:

- Add 162,500 acre-feet of active storage capacity to the basin;
- Meet the dry-year proratable irrigation water supply in two of six years;
- Meet municipal water supply needs;
- Increase stream flows in the Yakima River, but not to the extent of Black Rock reservoir;
- Increase anadromous fish stocks by 1 to 3 percent and steelhead stocks by 1 percent;
- Improve overwintering habitat for juvenile salmonids in the Cle Elum River, but provide no other changes in salmonid habitat;
- Provide cooling in the Yakima River downstream of the discharge point during summer and fall, but cause a slight warming during dry years;
- Adversely impact bighorn sheep wintering habitat and core habitat for mule deer;
- Require the acquisition of 4,000 acres of private property;

- Cost $867 million to $1.34 billion with annual operating costs of $3 million ($1.9 million for energy pumping); and
- Have a benefit-cost ratio of 0.31.

The Wymer Dam Plus Yakima River Pump Exchange Alternative would have similar impacts to the Wymer Dam and Reservoir Alternative in addition to the following:

- Improve aquatic habitat by leaving water in the river that otherwise would have been diverted by Roza and Sunnyside Irrigation Districts;
- Increase anadromous fish stocks by 11 to 35 percent and steelhead stocks by 24 percent;
- Improve water quality in the middle and lower river because of higher summer flows;
- Require the acquisition of 110 acres of private property in addition to the 4,000 acres required for the dam and reservoir;
- Cost $4.07 billion with annual operating costs of $38 million ($20 million for energy pumping); and
- Have a benefit-cost ratio of 0.07.

Reclamation did not consider the benefits, when compared to the impacts and costs, to justify moving forward with any of the alternatives. Reclamation decided to terminate the storage study process; however, it continues to work with Ecology to evaluate solutions to water problems in the Yakima basin.

1.6 Separate SEPA Analysis

Ecology prepared a separate SEPA Supplemental Draft EIS, released December 10, 2008, that evaluated an integrated approach to water management in the Yakima River basin. The Integrated Water Resource Management Alternative included fish passage and fish habitat enhancement as well as storage options not fully considered in the January 2008 Draft Planning Report/EIS. The Supplemental Draft EIS addressed impacts of the additional alternatives only. It did not include duplicate analyses or additional analyses of enhanced water conservation, market-based reallocation of water resources, or ground water storage that were evaluated as State Alternatives in the January 2008 Draft Planning Report/EIS. The Supplemental Draft EIS was prepared at a programmatic level.

The State Alternatives, evaluated in the January 2008 Draft Planning Report/EIS, have been incorporated as elements of the Integrated Water Resource Management Alternative in this Final EIS. This Final EIS includes additional analysis of enhanced water conservation, market-based reallocation of water resources, and ground water storage as needed to respond to comments and to incorporate new information relevant to those alternatives. This Final EIS presents an integrated package of opportunities to address water resource problems in the Yakima River basin.

Although the Final EIS provides additional details on the alternatives, the analysis is still at a programmatic level. Specific projects proposed as elements of the Integrated Water Resource Management Alternative would require additional economic, technical, cultural, and environmental review prior to implementation. Projects will be evaluated as they are developed and ready for review.

This Final EIS also incorporates responses to comments on the Supplemental Draft EIS as well as the comments on the State Alternatives from the January 2008 Draft Planning Report/EIS. The comments and responses are located in Chapter 6.

1.7 Next Steps

Ecology intends to work with Reclamation and stakeholders in the Yakima River basin to develop a comprehensive water resource management implementation plan. The implementation plan will include selection and prioritization of projects that would be included in the alternative. The implementation plan would also identify costs and funding opportunities for the selected projects, including a proposal for congressional and state authorization and funding.

It is anticipated that the Integrated Water Resource Management Alternative would be implemented under the authority of and using a framework similar to the Yakima River Basin Water Enhancement Program (YRBWEP). YRBWEP is a federal program jointly implemented and funded by Reclamation and Ecology with local matches. For YRBWEP Phase II, the conservation focused phase of the program, a Conservation Advisory Group (CAG) has provided advice on implementation of the conservation component. Reclamation and Ecology have initiated formation of a Work Group similar to the CAG to help develop the comprehensive water resource management implementation plan. The Work Group will consist of entities and agencies with expertise in water and fish management in the Yakima River basin. Reclamation and Ecology have invited the following entities to send representatives to a kickoff meeting scheduled for June 30, 2009: the Yakama Nation; Benton, Kittitas, and Yakima Counties; the City of Yakima; Bonneville Power Administration; NOAA Fisheries; U.S. Fish and Wildlife Service; Washington Department of Agriculture; Washington Department of Fish and Wildlife (WDFW); Roza, Sunnyside Valley, Kennewick, and Yakima-Tieton Irrigation Districts and the Kittitas Reclamation District; Yakima/Klickitat Fisheries Project, Yakima Basin Fish and Wildlife Recovery Board; and American Rivers. Staff of local congressional representatives has also been invited.

1.8 Public Comment

Ecology and Reclamation have provided several opportunities for public comment and input during the Storage Study process. Ecology and Reclamation jointly conducted a scoping period for the Planning Report/EIS from December 29, 2006 to January 31,

2007. The scoping comments are summarized in a Scoping Summary Report.[5] Reclamation and Ecology held a public comment period on the January 2008 Draft Planning Report/EIS from February 1, 2008 to March 31, 2008. Reclamation responded to comments on the Joint Alternatives in the December 2008 Final Planning Report/EIS. Ecology responded to comments on the State Alternatives in Chapter 6 of this Final EIS.

In accordance with SEPA, Ecology implemented a scoping period for the Supplemental Draft EIS from June 27 to July 31, 2008. Public open houses were held in Yakima on July 21 and in Ellensburg on July 24. A total of 27 letters or emails were received during the scoping period. Written comments were received from the Yakama Nation, U.S. Fish and Wildlife Service, U.S. Forest Service, WDFW, Benton and Yakima County Boards of Commissioners, Yakima Basin Water Resource Agency, Yakima Basin Storage Alliance, Yakima Basin Fish and Wildlife Recovery Board, American Rivers, Center for Environmental Law and Policy, Wise Use Movement, and 15 individuals.

The comments received covered a number of subjects and represented a range of viewpoints. The major comments concerned:

- Recommendations that Ecology evaluate an alternative that incorporates a variety of elements to meet the goals of improving fish habitat and irrigation and municipal water supply and that the elements be evaluated as a packages rather than evaluating each in isolation;
- Recommendations that the Supplemental Draft EIS include elements such as restoration of fish passage, additional storage, additional conservation, water markets, and habitat restoration;
- Concerns about the effects of enlarging Bumping Lake on resident fish, wildlife, and plants and historic, cultural, and recreational resources;
- Recommendations that the Supplemental Draft EIS include a broader range of fish species and terrestrial species than were evaluated in the January 2008 Draft Planning Report/EIS;
- Opposition to or support for the proposed Black Rock reservoir; and,
- Comments related to the State Alternatives from the January 2008 Draft Planning Report/EIS.

A more detailed summary of comments is included in Appendix A. The Supplemental Draft EIS addressed the relevant and substantive issues identified during scoping.

Ecology conducted a public comment period on the December 2008 Supplemental Draft EIS from December 10, 2008 to January 16, 2009. Responses to comments submitted during that period are located in Chapter 6 of this Final EIS.

[5] Available at: http://www.usbr.gov/pn/programs/storage_study/scoping/summary.pdf

1.9 Adopted Document

Pursuant to provisions of the SEPA Rules (WAC 197-11-630), Reclamation's *Final Planning Report/Environmental Impact Statement for the Yakima River Basin Water Storage Feasibility Study* (Reclamation, 2008i) is adopted as part of this Final EIS to meet a portion of Ecology's responsibility under SEPA. The Final Planning Report/EIS addresses impacts associated with three water storage proposals in the Yakima River basin—Black Rock reservoir, Wymer reservoir, and Wymer reservoir plus Yakima River pump exchange. The Adoption Notice is included as Appendix D.

The *Final Planning Report/Environmental Impact Statement for the Yakima River Basin Water Storage Feasibility Study* is available online at: http://www.usbr.gov/pn/programs/storage_study/index.html. Section 1.5 of this document summarizes the impacts associated with Reclamation's three proposed storage projects.

1.10 Organization of this Document

Chapter 1 of this Final EIS provides background information on the Yakima River Basin Water Storage Feasibility Study and the previous environmental documents prepared on the project. Chapter 1 also describes the purpose of the project and the need for the additional environmental review undertaken by Ecology. A summary of the public comment opportunities and scoping process is also included.

Chapter 2 presents the Integrated Water Resource Management Alternative evaluated by Ecology. It incorporates elements from the State Alternatives from the January 2008 Draft Planning Report/EIS and the Integrated Water Resource Management Alternative from the December 2008 Supplemental Draft EIS. The chapter also summarizes how the alternatives were developed and describes alternatives considered but not carried forward to full evaluation.

An overview of the affected environment is presented in Chapter 3.

Chapter 4 evaluates the short-term or construction impacts and proposed mitigation measures associated with the Integrated Water Resource Management Alternative.

Chapter 5 describes the potential long-term or operational impacts and proposed mitigation measures of the Integrated Water Resource Management Alternative. In Chapter 5, the potential impacts are evaluated first for the individual elements of the Integrated Water Resource Management Alternative. This is followed by a discussion of the positive or negative impacts of implementing the elements as an integrated package. Impacts associated with the State Alternatives were described in Chapter 5 of the January 2008 Draft Planning Report/EIS. Chapter 5 of this Final EIS includes additional discussion of impacts from those elements of the Integrated Water Resource Management Alternative as appropriate. A discussion of cumulative impacts is included in Chapter 5.

Chapter 6 contains the comments received on both the January 2008 Draft Planning Report/EIS that were relevant to the State Alternatives and comments on the December

2008 Supplemental Draft EIS. The relevant comments from the January 2008 Draft Planning Report/EIS are presented first followed by responses to those comments. Then the comments on the December 2008 Supplemental Draft EIS are presented followed by responses to those comments.

The references used in the document are included in Chapter 7. Appendices to accompany information presented in this Final EIS are attached at the end of the document.

This EIS does not include an evaluation of impacts associated with air quality, noise, public services and utilities, or public health and safety because any impacts associated with those elements of the environment would be temporary construction impacts which were described in the January 2008 Draft Planning Report/EIS. This Supplemental Draft EIS does include climate change impacts and impacts to hydropower production in separate sections.

CHAPTER 2.0 ALTERNATIVES

2.1 Alternative Development Process

The Integrated Water Resource Management Alternative presented in this Final EIS is a combination of the State Alternatives described in the January 2008 Draft Planning Report/EIS (Reclamation and Ecology, 2008) and the elements of the Integrated Water Resource Management Alternative described in the December 2008 Supplemental Draft EIS. This section explains how the individual elements were selected and why they are combined into a single alternative in this Final EIS.

The Integrated Water Resource Management Alternative was developed in response to comments from water users that an integrated approached was needed to resolve water supply and fish problems in the Yakima River basin. The proposed alternative includes a package of actions intended to meet the objectives of providing additional water for irrigated agriculture and future municipal growth and improving habitat for anadromous and resident fish. The elements of the Integrated Water Resource Management Alternative will be implemented as a package to achieve maximum benefits in the basin.

2.1.1 Development of the State Alternatives for the Draft Planning Report/EIS

As described in Section 1.4, Ecology and Reclamation originally undertook the evaluation of alternatives to benefit irrigated agriculture, future municipal needs, and anadromous fish as part of a joint NEPA/SEPA EIS. For the Yakima River Basin Water Storage Feasibility Study, Reclamation's authority was limited to Black Rock reservoir and other storage options in the Yakima River basin. Those alternatives were jointly considered by Reclamation and Ecology and were referred to as "Joint Alternatives" in the January 2008 Draft Planning Report/EIS. Ecology viewed its responsibility under SEPA to evaluate reasonable alternatives to a proposal as requiring it to consider alternatives other than storage options in the Yakima basin to meet the study objectives. A number of the alternatives that Ecology considered were outside the authority and scope of Reclamation's Yakima River Basin Water Storage Feasibility Study and were described and evaluated separately as "State Alternatives" in the January 2008 Draft Planning Report/EIS.

Ecology developed the State Alternatives in response to comments received during scoping for the Draft Planning Report/EIS. Ecology determined that the objectives of the Yakima Storage Study are to provide additional water for irrigated agriculture and future municipal needs and to improve habitat for anadromous and resident fish. Based on these objectives and the scoping comments, Ecology decided to evaluate three additional State Alternatives in the January 2008 Draft Planning Report/EIS. Those alternatives were:

- Enhanced Water Conservation Alternative to implement water conservation measures in the basin;

- Market-Based Reallocation of Water Resources Alternative that includes water transfers and water banking; and
- Ground Water Storage Alternative that includes storage with both active recharge and passive recharge.

The State Alternatives were described in Chapter 3 and the impacts of the alternatives were evaluated in Chapter 5 of the January 2008 Draft Planning Report/EIS. For this Final EIS, Ecology has revised the State Alternatives to reflect comments received and to incorporate new information available since the January 2008 Draft Planning Report/EIS was written. The State Alternatives have been incorporated as elements of the Integrated Water Resource Management Alternative and are described in Section 2.3 below.

Additional information on the development of the Joint and State Alternatives for the January 2008 Draft Planning Report/EIS is provided in Sections 1.2 and 3.1.1 of the January 2008 document.

2.1.2 Development of the Alternatives for the Supplemental Draft EIS

Comments received on the January 2008 Draft Planning Report/EIS recommended that Reclamation and Ecology should consider a wider range of alternatives and that the alternatives should include an integrated approach to benefit all resources including fish passage and habitat improvements in addition to improved storage (Section 1.1). In response to those comments, Ecology worked cooperatively with staff from public agencies and entities concerned with water, fish, and habitat management in the Yakima River basin to identify, refine, and analyze an alternative for the December 2008 Supplemental Draft EIS that incorporated a variety of elements that could address the multiple facets of water resource problems in the Yakima River basin. The approaches identified include:

- Elements for providing fish passage at existing reservoirs and other structures and improving passage on tributaries;
- Elements to improve instream flow conditions on the mainstem and tributaries;
- Elements for storage that include construction of new storage reservoirs and structural and operational changes to existing reservoirs to optimize the basin's water supply; and
- Elements to enhance fish habitat on the mainstem rivers and tributaries.

These elements were refined into the Integrated Water Resource Management Alternative presented and evaluated in the December 2008 Supplemental Draft EIS. Fro this Final EIS, Ecology has incorporated the State Alternatives from the January 2008 Draft Planning Report/EIS into the elements of the Integrated Water Resource Management Alternative. This combined alternative is described in Section 2.3. Ecology will recommend use of all the elements of the Integrated Water Resource Management Alternative to develop a package of projects to meet the multiple purposes of improving anadromous and resident fish habitat and providing water supply for irrigation and future municipal needs.

2.2 Alternative 1 - No Action

Under the No Action Alternative, Ecology would not facilitate implementation of an Integrated Water Resource Management Alternative for improving water resources in the Yakima River basin. Ecology would not support development of new water storage in the Yakima River basin or expansion of programs to improve fish passage or habitat. In addition, Ecology would not propose enhanced water conservation, market-based reallocation of water resources, or ground water storage. Although Ecology would not develop such a coordinated proposal, various agencies and other entities would continue to undertake individual actions to accomplish such improvements. These actions could include water storage projects, artificial supplementation programs, fish passage, habitat improvements, and water quality improvements through the Total Maximum Daily Load (TMDL) projects. These actions, although beneficial, would only provide slow and partial progress in meeting Ecology's objectives. With the No Action Alternative, existing problems with water availability would likely worsen with increased population and climate change. Many of the in-basin factors limiting the restoration of sustainable salmonid fish populations in the Yakima basin would not be addressed. The No Action Alternative is intended to represent the most likely future expected in the absence of implementing the proposed alternative. For the purposes of this Final EIS, Ecology considers the No Action Alternative to include projects that are ready for implementation. These are projects that:

- Have been planned and designed through processes outside this EIS;
- Are authorized and have identified funding for implementation; and
- Are scheduled for implementation.

Several entities in the Yakima River basin, including the Yakama Nation, WDFW, Reclamation, U.S. Forest Service, NOAA Fisheries, Ecology, county and municipal governments, local conservation districts, non-profit organizations, and other landowners and managers throughout the basin have been actively involved in storage modification, supplementation, and fish enhancement projects in the past 20 years. Projects developed by these entities that meet the ready for implementation criteria described above are considered part of the No Action Alternative. The major projects considered part of the No Action Alternative are briefly described in the following sections.

Other projects that have been identified in various planning efforts, but are not funded or scheduled for implementation, were evaluated for inclusion in the Integrated Water Resource Management Alternative. The purpose of including previously identified projects in the Integrated Water Resource Management Alternative is to expedite their implementation and to identify opportunities for synergy between projects.

2.2.1 Yakima River Basin Water Enhancement Project

Initiated in 1995, the Yakima River Basin Water Enhancement Project (YRBWEP) is jointly funded by Reclamation and Ecology with local matches. Major funding for the project comes from annual congressional appropriations and biennial state legislative appropriations. A major component of YRBWEP is its Water Conservation Program which provides economic incentives to implement structural and nonstructural water conservation measures. The Conservation Advisory Group and Reclamation completed the Basin Conservation Plan in 1999 and implementation of conservation measures identified in the plan is ongoing. This No Action Alternative includes those conservation measures currently being implemented. The Basin Conservation Program also includes provisions to acquire land and water rights on a permanent and temporary basis to improve instream flows. For additional information on YRBWEP, see Sections 1.7.2 and 2.3.1 of the January 2008 Draft Planning Report/EIS.

2.2.2 Reclamation Improvements to Existing Facilities

Reclamation plans and constructs improvements to existing facilities when funding and priorities under existing programs allow. One such project is on the Roza Dam. Roza Dam was built with two 110-foot-wide roller gates that allow for the passage of Yakima River flow in excess of Roza Canal diversion requirements. During normal operation, the roller gates lift up to discharge water underneath the gates. Instead of opening a gate to let excess water flow underneath the gate, the roller gate can be lowered beyond the closed position to allow water to spill over the top of the gate. This process of lowering the roller gates past the closed position is known as “tucking.” The roller gates currently hinder smolt out-migration unless “tucked” periodically to allow surface spill. When no surface spill occurs at Roza Dam, downstream migrating fish must either navigate through the fish screen bypass which is located in slackwater with poor attraction flows, or swim deep and encounter high pressures and velocities to pass through a small slot near the bottom of the dam structure. The passage obstacle at Roza Dam increases overall travel time for migrants, prolongs exposure to predation in the dam pool, and may physically harm passing fish. Reclamation proposes modifications to the spill gates to allow some surface spill to be maintained under all conditions. Reclamation will complete final designs and complete implementation in 2009.

2.2.3 Yakima River Side Channels Project

This project was initiated in 1997, co-managed by WDFW and the Yakama Nation under the Yakima/Klickitat Fisheries Project (YKFP). The Yakima River Side Channels Project is funded on a biennial basis through the Northwest Power and Conservation Council (NPCC) Fish and Wildlife Program administered by the Bonneville Power Administration (BPA). The project is funded for the 2007-2009 biennium. Objectives include habitat protection and restoration in the most productive reaches of the Yakima River basin. The geographic focus includes Easton, Ellensburg, Selah, and Union Gap reaches on the Yakima River and Gleed reach in the lower Naches River. These areas were identified through the Reaches Project (Stanford et al., 2002). See Section 1.7.2.4 of the January 2008 Draft Planning Report/EIS for additional information on the Reaches Project. Active habitat restoration actions include reconnecting structurally diverse alcoves and side channels, introducing large woody debris, fencing, and revegetating riparian areas.

2.2.4 Yakima Tributary Access and Habitat Program

The Yakima Tributary Access and Habitat Program (YTAHP) is a multi-party effort to restore fish passage to Yakima River tributaries that historically supported salmon and to improve habitat in areas where fish access is restored. BPA has funded the program since 2001, with additional funding for individual projects coming from BPA and other sources, including the Salmon Recovery Funding Board, Ecology's Water Infrastructure Program, the Community Salmon Fund, and other local, state, and federal programs. Funded participants include Kittitas and North Yakima County Conservation Districts, WDFW, Yakama Nation, and South Central Washington Resource Conservation and Development. Other partners include the Kittitas Conservation Trust, Mid-Columbia Regional Fisheries Enhancement Group, Benton Conservation District, and Ecology.

In 2007, BPA funding supported the construction of 23 projects with an additional 9 projects receiving significant work toward project development, permits, design and/or secured funding. Projects funded through YTAHP are primarily fish screening and fish passage improvements, but also include riparian plantings, fencing, and irrigation system improvements that improve fish habitat conditions.

2.2.5 Yakima/Klickitat Fisheries Project

The Yakima/Klickitat Fisheries Project (YKFP) is a joint project of the Yakama Nation and WDFW, and is sponsored in large part by BPA with oversight and guidance from the Northwest Power Coordinating Council (NPCC). The YKFP is committed to salmon reintroduction through supplementation and habitat protection and restoration. It is designed to use artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and keeping ecological and genetic impacts to non-target species within specified limits. The YKFP is also designed to provide harvest opportunities. The framework developed by the Regional Assessment of Supplementation Project (RASP, 1992) was originally used to guide the planning, implementation, and evaluation of the YKFP. Presently, project guidance is also obtained from subbasin planning, the Hatchery Scientific Review Group, and other non-supplementation programs and processes. The purposes of the YKFP are to enhance existing stocks of anadromous fish in the Yakima and Klickitat River basins while maintaining genetic resources; reintroduce stocks formerly present in the basins; and apply knowledge gained about supplementation throughout the Columbia River basin.

Species currently being enhanced by the YKFP and the Yakama Nation Fisheries Program include spring, summer and fall Chinook salmon, coho salmon, sockeye salmon, and steelhead trout. A fall Chinook salmon supplementation program began in the Yakima basin in 1983 (Yakama Nation, 2007). Spring Chinook supplementation has been occurring since 1997. Coho supplementation in the Yakima basin began in 1995 (Dunningan et al., 2002; Yakama Nation, 2004); however, the Yakama Nation has been releasing hatchery coho in the basin since the mid 1980s. The YKFP summer Chinook program includes plans to incubate summer Chinook salmon for release in 2009 (Davis et al., 2008). The Yakama Nation is currently pursuing opportunities to acquire space at existing hatchery facilities to support incubation and rearing of sockeye for reintroduction in the Yakima basin (Johnston, personal communication, 2008a).

Currently, steelhead are not being artificially supplemented in the Yakima basin. Current efforts to improve steelhead status in the Yakima basin focus on kelt reconditioning (improving the health of salmon that have spawned) and increasing productivity of the existing population through habitat enhancement actions (Reclamation, 2005b; YBFWRB, 2008). The YKFP is currently developing a Master Plan that will assess future enhancement options (Reclamation, 2008c; YBFWRB, 2008).

2.2.6 Kittitas Conservation Trust

The Kittitas Conservation Trust implements conservation actions along the mainstem Yakima River and its tributaries. Funding sources include cost share matches such as the Salmon Recovery Funding Board (SRFB) and YTAHP. Projects funded include the Swauk Creek Water Storage Study, the Currier Creek Barrier Removal, Taneum Creek Fish Passage Improvements, and North Fork Teanaway River Conservation Easements.

2.2.7 Salmon Recovery Funding Board Supported Projects

In 1999, the Legislature created the Salmon Recovery Funding Board (SRFB) to administer state and federal funds to protect and restore salmon habitat in Washington State. Funding comes from the sale of state general obligation bonds and the federal Pacific Coastal Salmon Recovery Fund, and grants are awarded annually based on a public, competitive process. The Yakima Basin Fish and Wildlife Recovery Board (YBFWRB) is the lead entity responsible for coordinating SRFB grant applications in Yakima, Benton, and Kittitas Counties. Between 1999 and 2008, the Yakima Lead Entity has had 52 projects approved for over 9.7 million dollars in SRFB funding, all of which include funding matches from various state and federal funding sources (i.e., WSDOT, BPA). The funding has been used for projects such as providing fish passage and screening at small irrigation diversions, planting riparian areas, acquiring and protecting land with high priority fish habitat, restoring natural stream channel functions, and promoting fish-friendly agricultural practices.

2.2.8 Yakima County Comprehensive Flood Hazard Management Plans

As part of its Comprehensive Flood Hazard Management Plans, the Yakima County Flood Control Zone District (District) is currently implementing habitat restoration projects. These projects were identified in the Upper Yakima Comprehensive Flood Hazard Management Plan which was completed in 2007. The Plan includes the floodplain of the mainstem Yakima River from the mouth of Yakima Canyon to Union Gap and the Naches River from its mouth to Twin Bridges. Actions currently being implemented under the Comprehensive Flood Hazard Management Plan include floodplain restoration projects at several locations in the lower Naches River and in the Gap to Gap reach of the Yakima River. The District is presently working on the Comprehensive Flood Management Plan for Ahtanum and Wide Hollow and also plans to develop a plan for the lower Yakima River. Some actions are being implemented in Ahtanum Creek ahead of completion of the plan. The District is also implementing a study of stream channel functions and how infrastructure has altered the functions of the Yakima River “gaps” which are geologic control points in the river.

2.2.9 Washington State Department of Transportation Programs

The Washington State Department of Transportation (WSDOT) has various programs focused on meeting its stewardship goals of avoiding and minimizing environmental and habitat disturbance. Ongoing projects include wetlands mitigation, maintenance of habitat connectivity, and fish passage restoration. In Yakima and Kittitas Counties, WSDOT has funded over $2 million for fish passage barrier projects. The WSDOT 10-year fish passage project funding plan (2007-2019) includes funding for a project at Silver Creek, along Interstate 90 at mile post 70.9. Through its habitat connectivity and wetlands mitigation programs, WSDOT will continue to contribute funding to the Cascade Land Conservancy, the Kittitas Conservation Trust, YKFP, and other entities for land acquisition and conservation easements aimed at maintaining wildlife movement corridors and improving floodplain habitat function. WSDOT also funds restoration projects through its Chronic Environmental Deficiencies Program which identifies areas of state highways that are subject to chronic repair needs associated with impacts from stream channel erosion and flooding.

2.2.10 Private Conservation Groups’ Projects

Private conservation groups such as the Cascade Conservation Partnership, the Mountains to Sound Greenway Trust, and the Cascade Land Conservancy purchase and protect land for wildlife habitat and public benefit. Groups such as the Washington Water Trust and the Washington Rivers Conservancy have been actively purchasing or leasing water rights to improve instream flow in the Yakima River basin. These groups depend on a variety of public and private funding and have been successful in acquiring and protecting property from development activities.

One acquisition program that is currently underway is in Manastash Creek. The water rights purchase program is part of the Manastash Creek Restoration Project Instream Flow Enhancement Implementation Plan. This project is part of a Memorandum of Understanding between the Manastash Creek Irrigators, BPA, WDFW, Kittitas County Conservation District (KCCD), and Washington Environmental Council (WEC). This group agreed to work collaboratively after WEC sent a draft notice of intent to sue under the Endangered Species Act (ESA) to water users on Manastash Creek, WDFW, KRD and Westside Irrigating Company in February 2001.

In fall 2008, KCCD, Washington Rivers Conservancy, and Ecology conducted a reverse auction to purchase water rights on Manastash Creek. As a result of the auction approximately 3.0 cfs will be left instream during the first half of the irrigation season until June 30 and approximately 1.5 cfs until the end of the season on October 31.

2.3 Alternative 2 – Integrated Water Resource Management

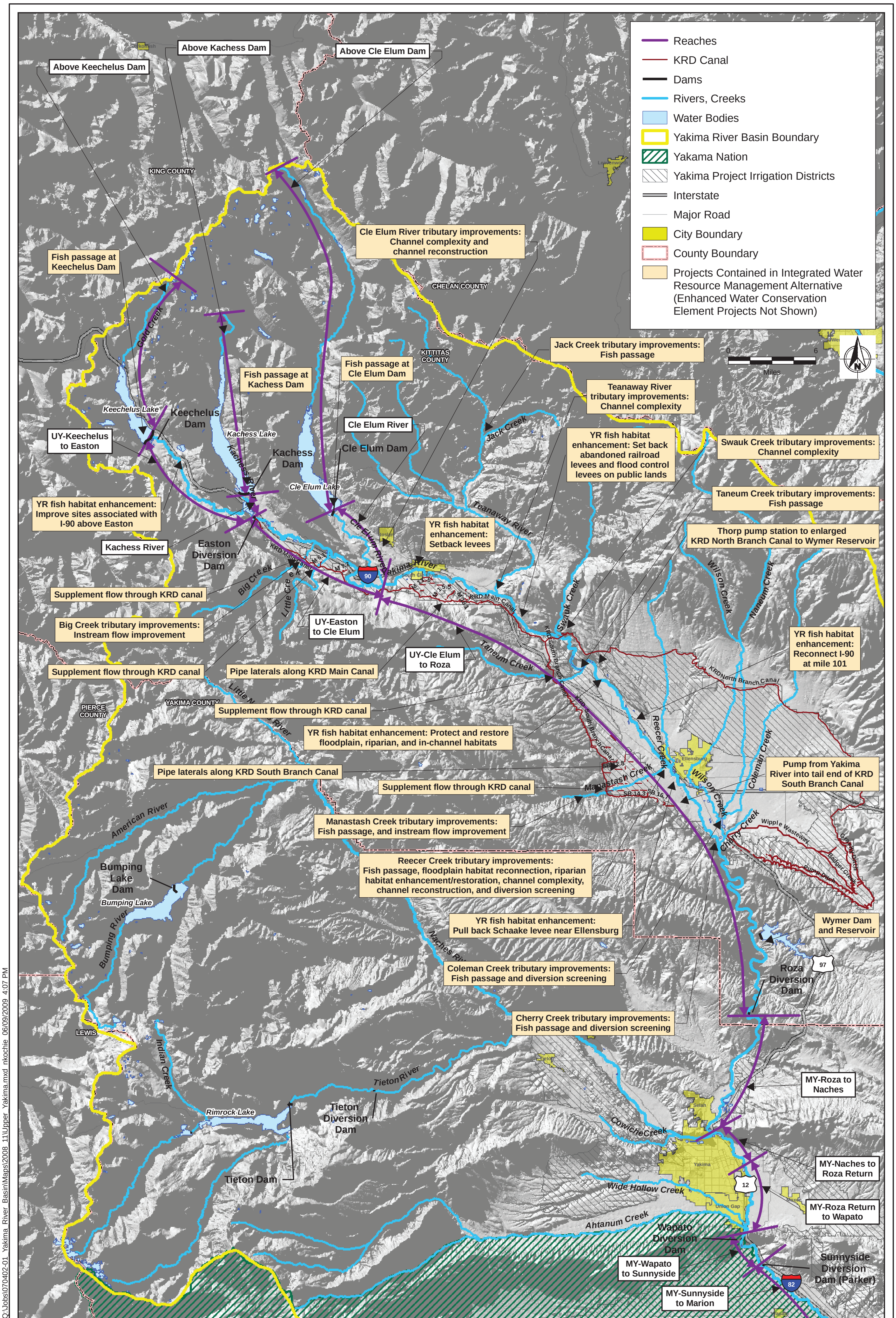
2.3.1 Introduction

Alternative 2 – Integrated Water Resource Management represents a comprehensive approach to water management in the Yakima River basin. This alternative includes the elements that were presented in the December 2008 Supplemental Draft EIS as well as the elements proposed as State Alternatives in the January 2008 Draft Planning Report/EIS. This alternative includes a package of elements to improve water supply and fish habitat. The elements in the package include both surface and ground water storage, structural and operational changes to facilities, fish passage and fish habitat improvements, as well as enhanced water conservation and marketed-based reallocation of water resources. These elements are described individually below; however, Ecology intends that, if selected, this alternative would be implemented in an integrated manner. Enhanced conservation, market-based reallocation, storage and fish passage and habitat enhancement projects would be completed as part of a total package, not as separate projects, to maximize benefits to fish and water supply. Figures 2-1 to 2-3 show the general location of the proposed passage, storage, and enhancement projects. Conservation projects are not shown because there are many projects scattered throughout the basin.

The proposed elements are described in the following sections:

- Fish passage at existing reservoirs, Section 2.3.2;
- Structural and operational changes to existing facilities, Section 2.3.3;
- New or expanded storage reservoirs, Section 2.3.4;
- Ground water storage, Section 2.3.5;
- Fish habitat, passage, and flow enhancements on the mainstem Yakima River and its tributaries, Section 2.3.6;
- Enhanced water conservation, Section 2.3.7; and
- Market-based reallocation of water resources, Section 2.3.8.

Ecology anticipates that the Integrated Water Resource Management Alternative would be implemented over a period of years. The exact timeline for implementation is not known at this time and would be largely dependent on the availability of funding. Ecology would work with Reclamation, the Yakama Nation, other water and fish managers, and local governments in the Yakima River basin to develop a more precise timeline as specific projects and funding are identified. See Sections S.5 and 1.7, Next Steps, for additional information on implementation. The projects proposed for the elements of the Integrated Water Resource Management Alternative in this Final EIS represent those that have been identified in existing studies and reports. Additional or different projects may be identified for the future as implementation proceeds. For example, the storage projects described in this Final EIS are those that have been identified in previous studies, but water managers may determine in the future that additional storage is needed to meet instream and out-of-stream needs than was identified in this analysis. Any new projects would undergo appropriate environmental analysis as they are identified and carried forward.



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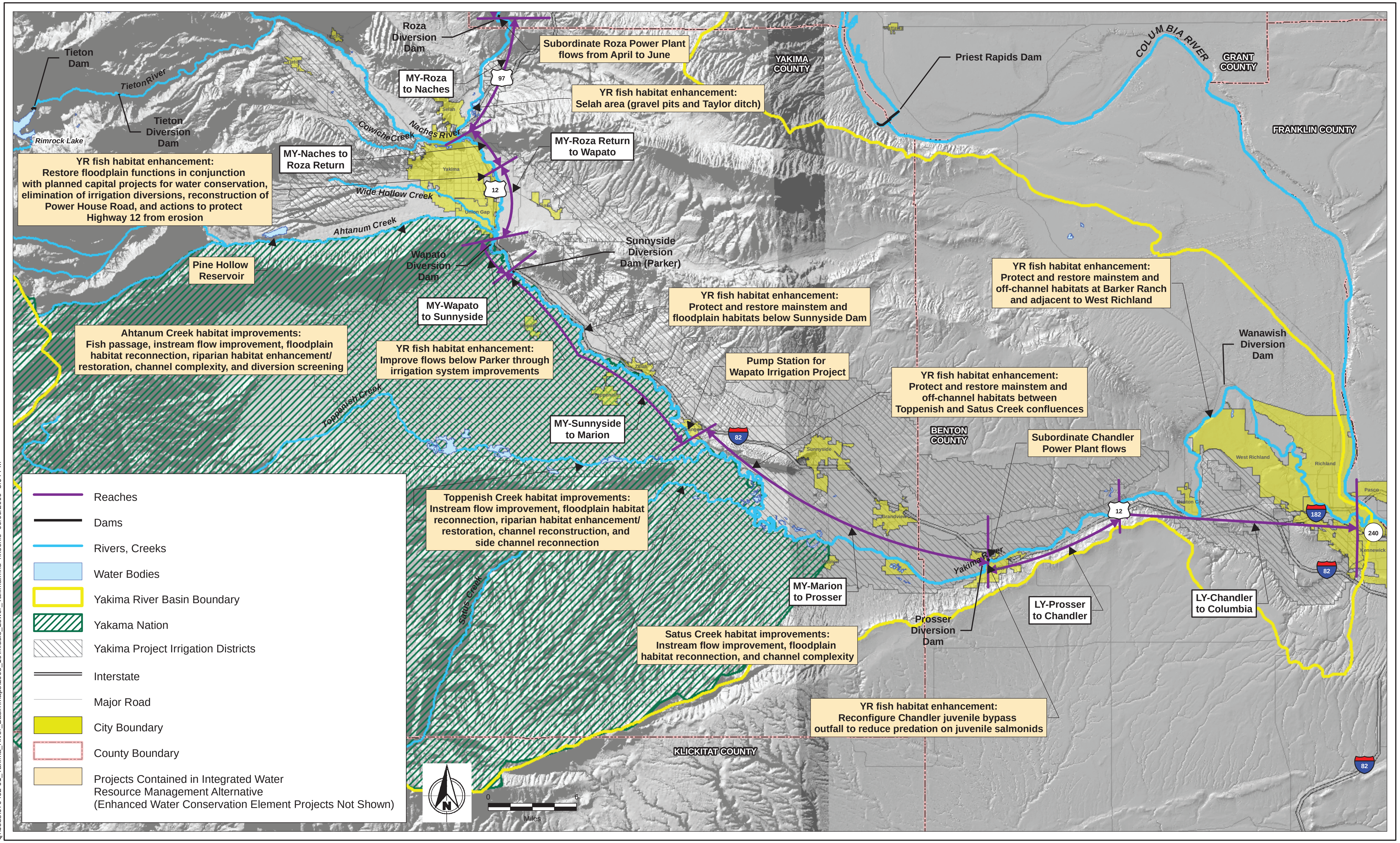
SOURCE: Anchor Environmental, 2009.

Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure 2-1
Upper Yakima River Reaches Map of Projects
Washington



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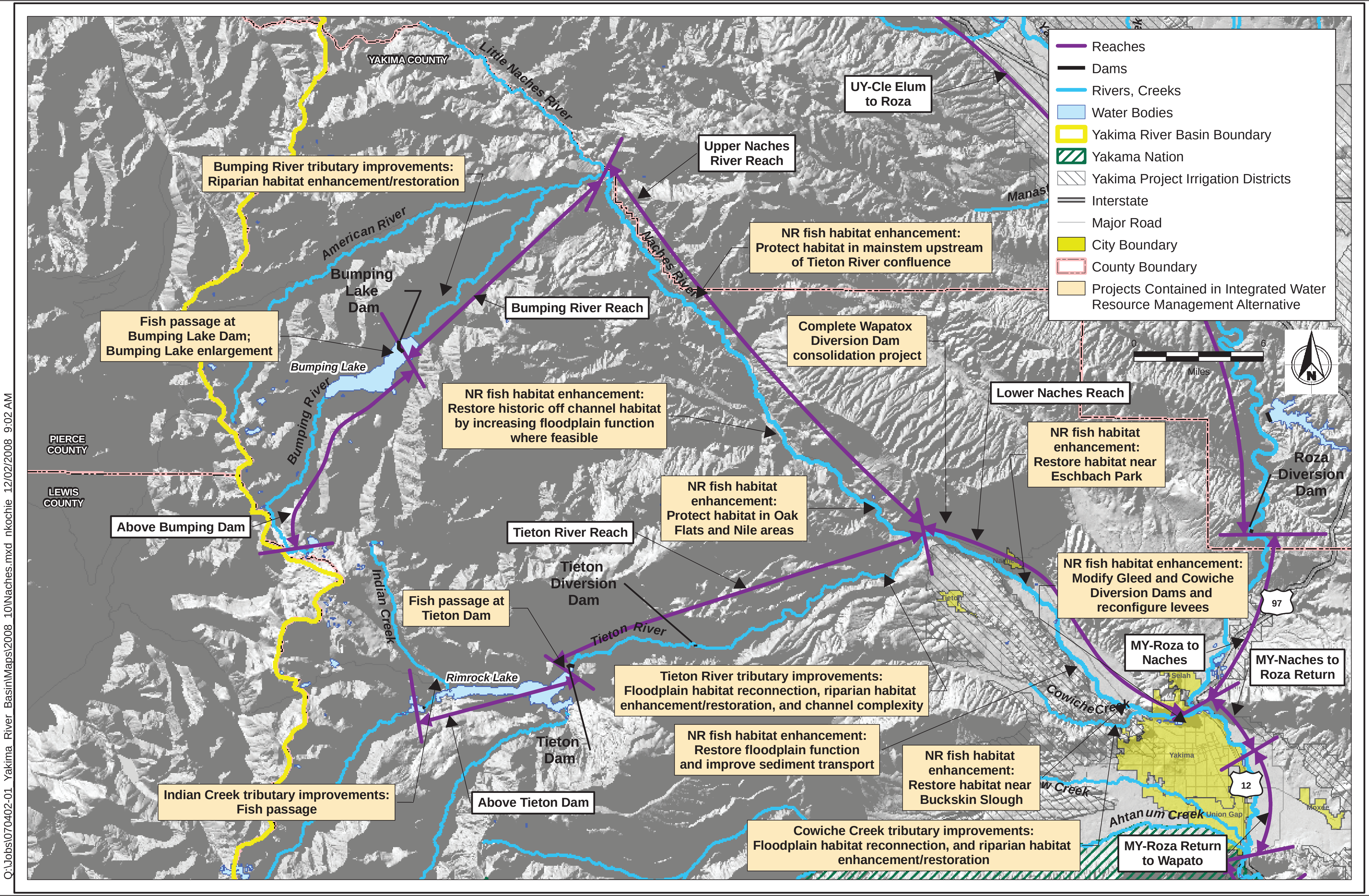
SOURCE: Anchor Environmental, 2009.

Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure 2-2
Middle and Lower Yakima River Reaches Map of Projects
Washington



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SOURCE: Anchor Environmental, 2009.

Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure 2-3
Naches River Map of Projects
Washington

Implementing the different elements of the Integrated Water Resource Management Alternative as a total package is intended to result in greater benefits than implementing any one element alone. Many studies have indicated that ecosystem-level resource management provides greater opportunities for efficiency, synergy, and cooperation between stakeholders which then result in greater overall benefits. For example, providing fish passage at existing reservoirs will open up new habitat for fish, which would benefit fish populations. By also implementing fish habitat improvements and improving flows basin-wide through additional storage and other actions, fish would have improved conditions for survival generally, contributing to increased abundance and productivity. If fish habitat enhancements are implemented without providing fish passage at existing reservoirs and improving flows, the habitat enhancements would have more limited benefits to fish.

New storage projects will provide water to reduce proration of irrigators and help meet future municipal needs. It may also provide additional flows for fish and allow existing reservoir operations to be modified to benefit fish. Enhanced water conservation would provide opportunities to reduce water demand and improve water supply. Market-based reallocation of water resources would provide flexibility to meet the water needs of fish, irrigators, and especially domestic water users. These combined elements may improve the reliability of water supply in drought years and reduce the amount of new storage needed. Ground water storage presents an opportunity to develop storage without the traditional impacts associated with above-ground storage.

An integrated approach that contains water storage and facility improvement projects that also meet fish management needs will have the highest likelihood of implementation and success over the long-term. The combined elements presented in this Integrated Water Resource Management Alternative would provide Yakima River basin water and fish managers as well as water users the variety of tools needed to meet their water supply needs and significantly improve conditions for fish.

2.3.2 Fish Passage Element

Under this element of the Integrated Water Resource Management Alternative, fish passage would be provided at existing storage reservoirs and other structures that currently restrict or block passage. The five major Yakima River basin reservoirs—Cle Elum, Keechelus, Kachess, Bumping, and Rimrock—do not currently have provisions for fish passage. Fish passage improvements on tributaries that are restricted by flow barriers are also included as part of the Fish Habitat Enhancement Element in Section 2.3.6.

Reclamation studied opportunities for providing fish passage at the five Yakima River basin reservoirs in its Yakima Dams Fish Passage Phase I Assessment Report (Reclamation, 2005a) and in the Draft Cle Elum and Bumping Lake Dams Fish Passage Facilities Planning Report (Reclamation, 2008c). The purpose of fish passage would be to reestablish populations of anadromous salmonids in some tributaries of the Yakima River. The Assessment Report concluded that some combinations of passage options are more feasible than others, both biologically and economically. Additional studies are needed prior to designing specific passage facilities.

The Yakima basin fisheries co-managers—the Yakama Nation and WDFW—have determined that artificial supplementation will be necessary to restore sustainable salmon and steelhead populations upstream of the reservoirs once passage is restored. The fisheries co-managers have developed plans for anadromous fish reintroduction upstream of the dams (Reclamation, 2005b). In addition, artificial spawning channels, constructed riffles, or other improvements may be needed to enhance spawning conditions for reintroduced fish.

The following sections provide a general description of fish passage options and potential benefits at each of the five Yakima River basin reservoirs, based both on potential fish benefits as well as engineering feasibility. The reservoirs are listed in order of priority for implementation according to potential benefits. Studies by Reclamation and the Yakama Nation indicate that fish passage at Cle Elum and Bumping Lake Dams would open up the most valuable habitat and provide the most benefits (Reclamation, 2008c). Reclamation and Ecology have begun preparation of a joint NEPA/SEPA EIS to evaluate impacts associated with fish passage and fish reintroduction at Cle Elum Dam. Additional information on existing conditions at the reservoirs is provided in Chapter 3 and further evaluation of the benefits of providing fish passage is provided in Chapter 5.

Cle Elum Dam

Cle Elum Dam is located in the upper Yakima River basin. The natural lake behind the dam historically supported anadromous Chinook, summer steelhead, coho, and sockeye salmon and bull trout (Haring, 2001). Although there are anadromous spring Chinook and steelhead below the dam, the lake currently holds only kokanee (a landlocked form of sockeye salmon), lake trout, and a remnant population of bull trout (Hubble, personal communication, 2008). No fish passage was provided when the dam was constructed (Reclamation, 2005a). Providing upstream and downstream fish passage at Cle Elum Dam would open up reservoir habitat as well as 29.4 miles of high-quality tributary habitat (Reclamation, 2008c). This includes 21.6 miles of the Cle Elum River, 0.6 miles of the lower Cooper River, and 7.2 miles of the lower Waptus River.

Currently, there are no upstream passage fish passage facilities at the dam; however, temporary downstream fish passage facilities have been constructed. The spillgate has been modified, a wooden passage flume has been constructed, and two PIT-tag (passive integrated transponder) monitors have been installed to test the feasibility of attracting and safely passing salmon smolts over the dam. Use of this facility is limited to a narrow window when the reservoir is high enough to allow water to be released down the spillway. The timing of reservoir height may not coincide with the actual smolt passage window (i.e., the reservoir may fill late in the spring after the optimal time for smolt passage through the lower Yakima River). The proposed, multilevel downstream fish passage structure, described below, eliminates this problem by allowing passage to begin at a much lower reservoir elevation and continue as the lake refills. Reclamation has determined that operation of the fish passage facilities at Cle Elum Dam will have no adverse effect on Total Water Supply Available (TWSA) (Christensen, personal communication, 2009).

Reclamation studied several options for upstream and downstream fish passage at Cle Elum Dam in the Assessment Report (Reclamation, 2005a) and the Draft Fish Passage Planning Report (Reclamation, 2008c). The basic concept for downstream passage would provide water releases with enough volume to attract migrating juvenile fish to an overflow gate in the reservoir that would lead to a conduit for safe discharge of the fish downstream of the dam. The goal is to maximize passage for the majority of the season when smolts are migrating in early March to June, even in drier years (Reclamation, 2008c). Reclamation determined that the most technically feasible option for downstream passage at Cle Elum Dam is a multi-level gated concrete intake structure located just above the spillway inlet channel and a conduit through the right abutment of the dam. For upstream passage, a trap and haul facility is proposed in lieu of a fish ladder.

The gates on the downstream passage structure would allow release of fish passage flows at any time that the reservoir water surface is in the upper 50 feet of full pool (Reclamation, 2008c). Downward opening gates would be used to provide surface release, or weir flow, to attract fish from the reservoir into the intake structure. The gates would provide fish passage flows in the range of 100 to 400 cubic feet per second (cfs). Fish would then spill over a series of weirs and pools, depending on the water surface elevation of the reservoir, into the fish passage conduit. The fish passage conduit would be a 7-foot-diameter reinforced concrete structure 1,520 feet long. Fish would move through the conduit into the spillway stilling basin and then be able to move down river.

The trap and haul facility for upstream passage would include an angled barrier structure to guide fish to a fish ladder and collection facility (Reclamation, 2008c). A 300-foot-long barrier dam angled about 55 degrees to the river flow would span the width of the Cle Elum River about 150 feet downstream from the spillway stilling basin. The barrier dam would guide fish to the fish ladder entrance on the left side of the river. Fish would swim up the ladder into the collection facility. When adequate numbers of fish are collected in the facility, they would be transported by truck upstream and released in the reservoir and upstream tributaries. The barrier dam and adult collection facility would be operated from early March to late December. The trap and haul facility is considered more feasible than the long fish ladder that would be needed to accommodate typical reservoir fluctuations in excess of 100 vertical feet. Trap and haul methods for upstream fish passage have been used successfully at other large dams in the Pacific Northwest (Reclamation, 2008c).

Bumping Lake Dam

Bumping Lake Dam impounds a natural glacial lake that historically supported anadromous Chinook, summer steelhead, coho, and sockeye salmon and bull trout (McIntosh et al., 2005; Haring, 2001). Anadromous salmonid fish passage upstream of the dam was eliminated with construction of the dam in 1910 (Reclamation, 2005a).

Currently, the Bumping River supports anadromous spring Chinook and steelhead below the dam, and bull trout above the dam (Haring, 2001).

If upstream and downstream fish passage were provided at Bumping Lake, reservoir habitat as well as approximately 6.6 miles of high-quality migration, spawning, and rearing habitat in the Bumping River (1.0 mile up to a natural falls at River Mile (RM) 22) and in Deep Creek (5.6 miles) would become available for salmonid fish species (BPA, 1990; Reclamation, 2005a). However, in below average water years, there are two areas of Deep Creek that go dry. The lowest site is approximately 1.5 mile upstream from the creek mouth at Bumping Lake, and the other is upstream beginning approximately 1 mile above the mouth of Copper Creek. These areas currently limit migration for bull trout, and would likely continue to do so regardless of fish passage at the dam.

Reclamation evaluated several options for fish passage at Bumping Lake Dam in its Assessment Study (Reclamation, 2005a) and the Draft Cle Elum and Bumping Lakes Fish Passage Facilities Planning Report (Reclamation, 2008c). Reclamation concluded that a downstream passage option similar to the one at Cle Elum Dam and a trap and haul facility for downstream passage were the most technically feasible (Reclamation, 2008c). This description of fish passage facilities is based on the existing configuration of Bumping Lake. If the reservoir is expanded, fish passage facilities would be provided at the new dam. Those fish passage facilities would likely be different from the ones described above.

The proposed downstream passage facility would include a reinforced concrete intake structure and a conduit through the dam embankment (Reclamation, 2008c). The intake structure would include two multi-level folding overshot, or tilting weir, gates set at different elevations to control passage release flows. The gates would be raised or lowered as needed to match desired outflow and reservoir levels. Fish would pass over the gates into a 20-foot-long by 20-foot-wide stilling pool that would vary from 5 to 10 feet deep and then into a conduit. The reinforced, cast-in-place concrete conduit, 230 feet long and 7 feet in diameter, would carry fish from the upstream intake structure and discharge them downstream into the river near the dam outlet works. The downstream fish passage facilities would generally be operated from early April to late June.

The trap and haul facility for upstream passage would include a barrier structure angled at 35 degrees to the outlet works channel constructed across the river to guide fish to the fish ladder entrance and into the collection facility (Reclamation, 2008c). Fish would swim up the ladder into a holding pool. When adequate numbers of fish are collected in the facility, they would be placed into a fish transport truck to haul the fish upstream for release into the reservoir and upstream tributaries. The barrier and adult collection facility would generally be operated from early April to late November.

Tieton Dam

Tieton Dam creates Rimrock Lake on the Tieton River. Historically, the area now inundated by Rimrock Lake area was a glacial outwash valley called McAllister

Meadows. The floodplain linked the salmonid spawning areas of the North and South Fork Tieton Rivers, Indian Creek, and others. The mainstem Tieton River and the North and South Forks of the Tieton River and their tributaries historically supported anadromous spring Chinook, summer steelhead, coho, and fluvial (river-dwelling) bull trout (McIntosh et al., 2005; Haring, 2001). Currently, vestigial runs of spring Chinook and steelhead exist in the Tieton River downstream of the dam based on observations of adult fish or redds by WDFW and Yakama Nation biologists (WDFW, 2009). Kokanee and bull trout reside in the reservoir and/or inflowing tributaries (Hubble, personal communication, 2008; WDFW, 2009). These populations of kokanee and bull trout are the most abundant in the Yakima basin (WDFW, 2009). Tieton Dam has no fish passage facilities (Reclamation, 2005a) and is known to entrain both kokanee and bull trout in the unscreened outlet works during large water delivery operations (Haring, 2001; Hiebert, 2004).

If fish passage were provided at Tieton Dam and the upstream Clear Lake Dam, reservoir habitat in addition to approximately 36.8 miles of spawning and rearing habitat would become available (Reclamation, 2005a). This would include 9.9 miles of the North Fork Tieton; 13.5 miles of the South Fork Tieton; 6.9 miles of the North Fork tributaries—Clear Creek and Indian Creek; 0.5 miles of Bear Creek, a South Fork tributary; 0.1 mile on Short and Dirty Creeks; 2.2 miles on Corral Creek; and 3.7 miles on the Rimrock tributary, Bear Creek (Reclamation, 2005a). The numbers for the North Fork assume that passage would also be provided at Clear Lake Dam.

Options for upstream passage at Tieton Dam are limited to trap and haul because the dam's structural height does not allow a ladder with pumped flow option (Reclamation, 2005a). Downstream passage options include passing fish through a spillway and a collection and release option for juveniles. Because the dam height does not allow an attraction flow pipe into the existing outlet works, a new outlet works was not considered. The spillway gates at Tieton Dam are drum gates, so if spillway gate modification was chosen, they would be modified. In addition, the option for the new spillway would discharge flow into a bypass conduit that would end in an outfall to the river, rather than to the series of pools. Evaluation of spillway options for Tieton Dam will require an analysis of fish injury and mortality. The Phase I Assessment Report for Yakima Dams fish passage reported that juvenile out-migrants passing over the Tieton Dam spillway might encounter severe conditions that could cause substantial injury and result in some level of mortality (Reclamation, 2005a).

Also included in the Tieton Dam improvements are passage options at Clear Lake Dam and/or spillway, which is located upstream of Tieton Dam. The discovery in 2006 of a significant spawning population of bull trout in the upper North Fork Tieton River has lead WDFW, USFWS, USFS and Reclamation fish biologists to question whether Rimrock Reservoir adfluvial fish (fish living in lakes that migrate to rivers or streams to spawn) are finding a migration pathway over the Clear Lake Dam spillway at certain flows as they move upstream from Rimrock Lake. Thus, modifications could be made at Clear Lake Dam to take this into account and to improve upstream passage over a wider range of flows for these fish.

Keechelus Dam

Keechelus Dam is located in the upper Yakima River basin. Keechelus Lake and its tributaries historically supported anadromous sockeye, spring Chinook, steelhead, and coho salmon and bull trout (McIntosh et al., 2005; Haring, 2001). Currently, resident species inhabiting the reservoir and tributaries include rainbow trout and kokanee. Kokanee spawn in Gold Creek, a tributary to Keechelus Lake, and Coal Creek. Gold Creek also supports a remnant run of bull trout. Other tributaries to the lake with high-quality habitat are now inundated by the reservoir and/or blocked by manmade barriers (Haring, 2001). The dam provides no fish passage facilities.

If fish passage were provided for this dam, reservoir habitat would be available in addition to approximately 13.8 miles of tributary stream habitat, including approximately 7 miles of stream habitat in Gold Creek (Reclamation, 2005a). However, low base flows in Gold Creek currently limit migration for bull trout upstream of the maximum lake elevation (Reclamation, 2000) in some years and would continue to do so regardless of fish passage at the dam unless habitat restoration projects in Gold Creek could remedy low base flow conditions.

The options for allowing fish passage at Keechelus Dam are the same as those at Tieton Dam, except that an option for a new spillway was considered, which would discharge flow directly into the pipes from the gates (Reclamation, 2005a).

Kachess Dam

Kachess Dam is located on the Kachess River in the upper Yakima River basin. Historically, the Kachess River upstream of the dam supported anadromous runs of spring Chinook, steelhead, sockeye, and coho, migratory and resident bull trout, and resident rainbow trout as well as other non-salmonid resident fish species (Reclamation, 2005a). Fish passage was blocked with construction of Kachess Dam in 1912, and possibly as far back as 1904 with the construction of a crib dam on the Kachess River. Currently, there are no anadromous salmonids upstream of Kachess Dam, only resident fish species, including resident bull trout, kokanee, and resident rainbow trout.

If fish passage were provided for this dam, reservoir habitat as well as approximately 2.4 miles of tributary stream habitat would be available to anadromous fish, including 1.6 miles of Box Canyon Creek, 0.5 miles of the Kachess River, and 0.25 miles of Mineral Creek (Reclamation, 2005a). However, lake drawdowns would continue to cause low-flow passage issues for fish in both Box Canyon Creek and the Kachess River (Haring, 2001) unless habitat restoration projects are implemented to address passage impediments during lake drawdowns. In addition, there are five culverts in various tributaries to the Kachess River upstream of the dam, which would become fish passage barriers if fish were migrating to and through these areas. Bull trout are not known to use the streams where these barriers occur (USFS, 1997). The options for allowing fish passage at Kachess Dam are the same as those at Tieton Dam, except that multiple level spillway gates are not necessary since the spillway only has a single gate (Reclamation, 2005a).

2.3.3 Modifying Existing Structures and Operations Element

Modifying existing structures and operations provides opportunities to benefit fish by improving flows in some reaches and reducing mortality of smolts at some facilities. Operational changes proposed include reducing the amount of water diverted for power generation at the Roza and Chandler Power Plants in spring to increase instream flow and improve smolt out-migration. Structural changes include modifying fish bypass systems and canals, and moving points of diversion to increase flows in reaches of the Yakima River.

2.3.3.1 Operational Changes at Existing Facilities

Water diverted at Roza Dam is used for both irrigation deliveries and power generation. The water diverted for power generation is discharged to the Yakima River 15 miles downstream of Roza Dam. Reclamation's System Operations Advisory Committee (SOAC) recommends higher out-migration flow below Roza Dam to reduce downstream travel times and increase smolt survival. This action would reduce or eliminate diversions for power during the smolt out-migration period. The power not generated would need to be replaced from the BPA grid. Biologically based instream flow targets for this reach need to be determined for that period to determine the amount of flow that is desired. Reclamation has not yet committed to this action. The operational changes at Roza Dam would not affect irrigation diversions of deliveries.

Flows diverted to run the Chandler Power Plant reduce flows in the Yakima River from Prosser Dam to the power plant return 12 miles downstream. During spring, Reclamation currently reduces generation at the Chandler Power Plant whenever flows would otherwise drop below 1,000 cfs. Increasing flows when salmonid smolts are moving through the lower Yakima River should increase water velocity and may reduce juvenile travel time in the bypass reach between Prosser Dam and the Chandler Power Plant outfall. It would also reduce the proportion of smolts entrained to the Chandler canal and thereby reduce mortality rates in the juvenile fish bypass system, including the outfall area in the river. This action would be performed by Reclamation. Reclamation has not committed to this action at this time; however, implementation could be facilitated by proposed changes to the Kennewick Irrigation District (KID) irrigation system which may be partially funded by Ecology.

2.3.3.2 Structural Changes to Existing Facilities

Structural changes to existing facilities could provide benefits to anadromous fish passage and possibly improve water supply for irrigation. Projects proposed as part of this element include improvements to the Wapato Irrigation Project (WIP) and changes to the Chandler juvenile bypass outfall.

The WIP is working with Reclamation under YRBWEP to move the point of diversion for the Satus division from Wapato Dam to a new pump station near Granger, which would leave water instream for an additional 25 miles. This proposal is similar to other projects such as the Kennewick Irrigation District (KID) Pump Exchange Project and the

Benton Irrigation District Pump Project. These projects would improve mainstem flows below Parker Dam during the irrigation season while also resulting in improved water delivery for irrigators.

The KID Pump Exchange Project is designed to reduce diversions from the Yakima River by transferring part of KID's diversion to the Columbia River. The current diversion of water for KID begins at Prosser Dam at RM 47.0. Prosser Dam diverts that water into the Chandler Canal. The flow in the canal can vary from 1,100 to 1,500 cfs, depending on the condition of the canal. The diversion for KID includes irrigation water supply and water used to operate hydraulic pumps and is generally 783 cfs. The canal operates year-round except for a maintenance period in October and November. The canal water travels 11 miles downstream, paralleling the mainstem Yakima, to the Chandler Power and Pumping Plant at RM 35.8. At this point up to 435 cfs of canal water turns hydraulic pumps that move up to 348 cfs of canal water under the river, up the opposite bank, and into the KID irrigation canal. A ratio of 1.25 cfs to 1 cfs pump water to KID water is required to deliver water to the KID canal water from Chandler. The water (up to 435 cfs) that was used to turn the hydraulic pumps is returned to the river below the power plant. The balance of the water in Chandler Canal is sent through electrical turbines at the power plant, and is returned to the river below the plant.

With the Pump Exchange, a new pump station will be constructed on the Columbia River in Kennewick, reducing diversions at Prosser Dam. The current plan is to divert 372 cfs at Prosser Dam for KID of which 207 cfs is needed for hydraulic pumps and 165 cfs will be delivered to the KID canal. The result will be an increase in flow of 411 cfs in the 11-mile reach of Yakima River where the Chandler Canal is located. These increased flows in the lower Yakima River would benefit migrating salmonids.

Another part of the proposed project is for the Columbia Irrigation District (CID) diversion to be included in the KID pump station routing. CID's current diversion of approximately 160 cfs is at Wanawish Dam at RM 18.0, approximately 29 miles below Prosser. Wanawish Dam would continue to be used and maintained, diverting approximately 45 cfs. The remaining irrigation needs would be supplied by the KID pump exchange project. The total improvement in flow in the Yakima River downstream of the CID diversion will be 138 cfs. That accounts for the 207 cfs flow returned to the Yakima River from the hydraulic pumps at the Chandler Power and Pumping Plant.

The current configuration of the juvenile bypass outfall at Chandler Dam concentrates avian and aquatic predators which prey on fish as they exit the bypass. A more diffuse outfall and/or provision of additional cover or safe recovery areas for juveniles that transit the bypass would improve survival. Studies are needed to determine if similar predation problems exist at Wanawish (formerly Horn Rapids), Parker, Wapato and Roza Dams.

2.3.3.3 Kittitas Reclamation District Canal Modifications to Improve Tributary Flows

Four tributaries in the Kittitas Reclamation District (KRD) have instream flow problems that could be addressed through changes in KRD infrastructure and operations —Taneum and Manastash Creeks crossing the South Branch Canal, and Big and Little Creeks crossing the Main Canal. KRD currently augments flow in those streams with operational spills and sometimes conveys and discharges flow when requested by Reclamation to provide flow in the streams. Modifications to the KRD Main Canal and South Branch Canal to increase capacity to allow additional discharge to the creeks or to provide water to water users diverting from the creeks would enhance tributary flow. Options for these modifications are listed below. In addition to these projects, water conservation and water acquisition applied to the tributary water users could improve flows in the tributaries.

Lateral Piping Projects along the Main Canal and South Branch Canal

Five laterals on the Main Canal (M4.9, M6.1, M7.7, M13.6, and M16.9) and five laterals on the South Branch Canal (SB9.9, SB13.8, SB14.3, SB16.7 and SB17.6) are candidates for replacement with pipe. The laterals would be converted to pressurized systems, reducing seepage and spill at the tail end of the lateral. The piping projects would free up capacity in the Main Canal and South Branch Canal to allow discharge directly to creeks or to supply water users diverting from the creeks. The volume of water that can be supplied by this option is not precisely known, but is estimated from existing reports to be 14.9 cfs on average throughout the irrigation season.

Pumping near Tail End of Canal

This option would place a pump station on the Yakima River near the tail end of the South Branch Canal in the KRD and install a pressurized pipe system. The pump station would supply water users on the lower end of the KRD system (currently served by laterals SB14.3, SB16.7 and SB17.6), freeing up capacity for flow in the Main Canal and South Branch Canal that could either be discharged directly to creeks or to water users diverting from the creeks. The volume of water that could be supplied by this option is estimated to be 25 cfs on average throughout the irrigation season.

Alternatively, the pumped water could be supplied directly to Manastash Creek water users allowing additional flow to remain in that creek during periods of low stream flow which occur from July to the end of the irrigation season. The pump station could be located at Riverbottom Road or on the west side of Manastash Creek near the Packwood Canal.

2.3.3.4 Complete the Wapatox Project

Reclamation acquired the Wapatox Power Plant and diversion in 2003 in order to use the associated 350 cfs water right to augment instream flows in 7.4 miles of the lower Naches River. The Wapatox diversion also supplies water to several irrigators so the diversion remains active. The conveyance system was designed for 400 cfs and needs approximately 110 cfs to provide sufficient head to run the system. This has reduced the amount of water Reclamation has been able to put to instream use. Modifying the conveyance system would allow irrigators access to their full water rights while allowing all of Reclamation's water right to be left instream. Consolidating the Wapatox and Naches-Selah diversions has also been proposed, which would address this issue, increase instream flows by 100 cfs between the Naches-Selah and Wapatox diversions, and reduce constraints on Bumping Lake Reservoir operations.

Another possible option is to use the Wapatox diversion to supply the Yakima water treatment plant and the Gleed ditch. This would eliminate the need for those two diversions from the river, allow for restoration of flows in a large reach of the Naches River, and allow improvements in floodplain function.

2.3.4 New Surface Storage Element

Water storage facilities are a vital element of the Integrated Water Resource Management Alternative. Opportunities exist to expand existing water storage facilities or construct new facilities. These storage facilities would provide an improved water supply for irrigation during low water years and for future municipal growth and improve flows for anadromous and resident fish. In response to comments received on the January 2008 Draft Planning Report/EIS, the Integrated Water Resource Management Alternative considers the potential for new or expanded storage in the Naches River basin and different approaches to filling Wymer reservoir. It also evaluated an off-channel reservoir in the Ahtanum Creek basin as a surrogate for addressing water supply needs in Yakima River tributaries that would not be met through a mainstem storage project. Other storage options have been evaluated by Reclamation in the Final Planning Report/EIS and in previous studies (see Section 2.4). For the Naches River basin and Wymer options, this section includes a discussion of opportunities to modify reservoir operations if new storage is provided. Ground water storage opportunities are discussed in Section 2.3.5.

2.3.4.1 Naches River Storage Reservoirs

Additional storage in the Naches River basin would provide water to supplement supplies for proratable irrigators in low water years. Additional storage in the Naches River basin could also provide additional spring and summer flow in the Bumping, Naches, and lower Yakima Rivers, especially during drought years. Ecology considered several options for providing additional storage in the Naches River basin. Because expansion of Bumping Lake is the most developed proposal at this time, it is included as a proxy for a storage facility in the Naches River Basin. That allowed Ecology to model water availability and other factors. Other potential storages sites in the Naches basin have been evaluated in the past (see Section 2.4.2), but have were not considered feasible.

Expansion of Bumping Lake was also included at the request of the Yakama Nation and Roza Irrigation District which hold two of the largest proratable irrigation water rights in the basin (see Comment Letter Number 1 in Chapter 6). They suggested that storage potential in the Naches River basin should be evaluated with a more rigorous water budget analysis than was used by Reclamation in the Planning Report/EIS. They also requested that modeling of Bumping Lake not use normative flows to evaluate stream flow benefits. The analysis of Bumping Lake in this EIS used Reclamation's RiverWare model to develop a water budget and included stream flows agreed upon by representatives of Reclamation, the Yakama Nation, and basin fish managers.

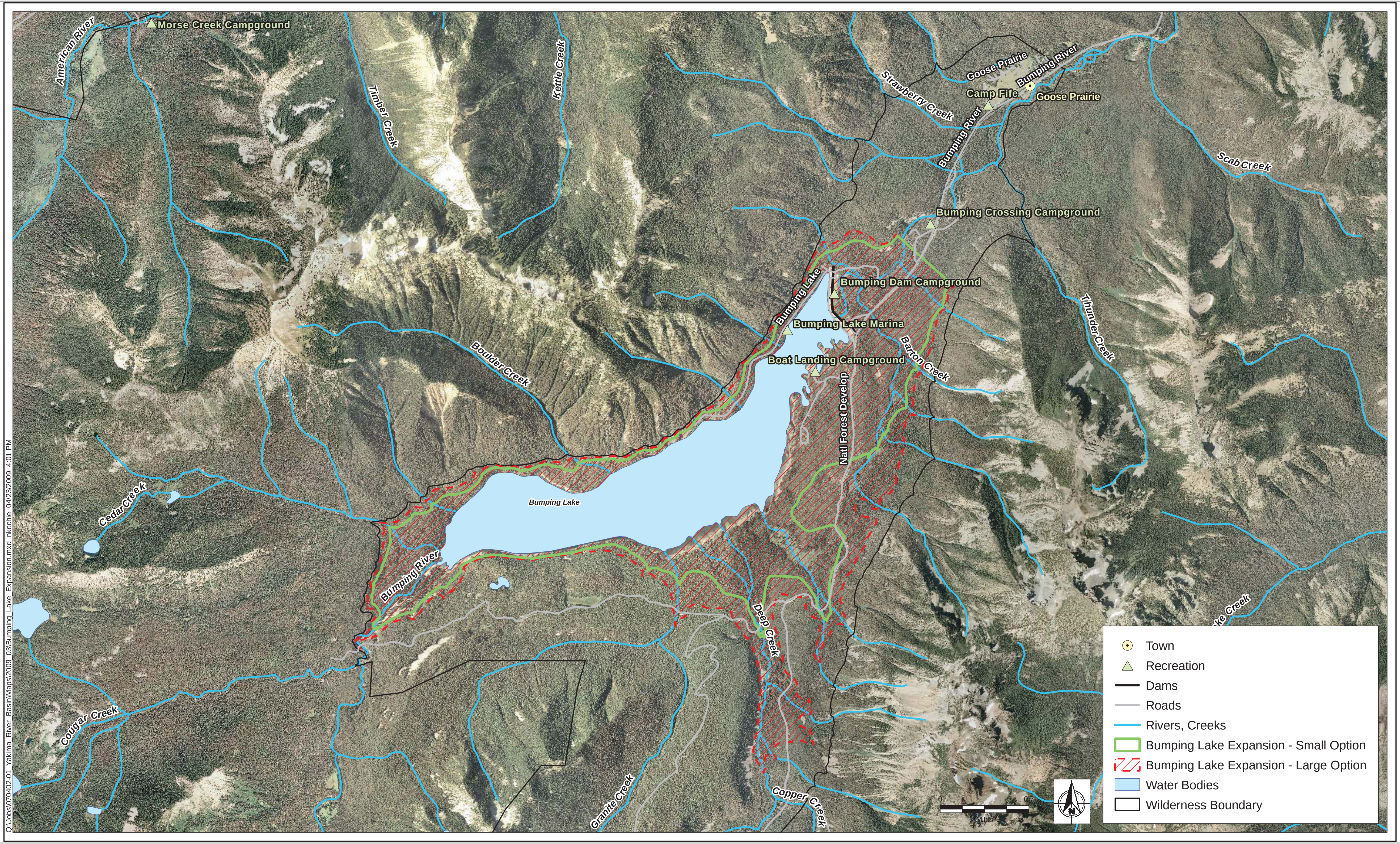
Bumping Lake Expansion

Bumping Lake is one of the six storage reservoirs in the Yakima Project. It is located on the Bumping River 16.6 miles upstream of the confluence of the Little Naches River. The current reservoir has a 61-foot-high earth dam with a storage capacity of 33,700 acre-feet (Reclamation, 2006).

Enlargement of Bumping Lake has been evaluated in numerous studies (Reclamation and USFWS, 1966; Reclamation, 1979; Reclamation, 2006). The proposal consists of a new dam located approximately 4,500 feet downstream of the existing dam. Options for a 458,000 acre-foot reservoir (large option) and a 200,000 acre-foot (small option) are presented in this Supplemental Draft EIS. Both options are shown in Figure 2-4.

The additional water supply that would be captured and stored would be used to improve instream flow for fish and to provide irrigation water supply during drought years. The allocation of water to each purpose has not been set nor has the recipient(s) of the irrigation water supply been determined. For the purposes of this EIS, it was assumed a storage volume of 100,000 acre-feet would be available to enhance water supplies for Roza Irrigation District, which has proratable water rights. The water would be available for use in drought years when proration levels drop below 70 percent. The water stored in Bumping Lake would also be used to enhance stream flow in the Bumping and Naches rivers and in the Yakima River below the Parker gage. For the purposes of this EIS, a stream flow regime was proposed based on recommendations from representatives of Reclamation, the Yakama Nation, and basin fish managers. The stream flow regime simulated a spring runoff starting April 1 and increasing up to 600 cfs at July 1. During drought years, an additional 42,000 acre-feet would be available to augment spring flow past the Parker gage.

The specific uses of the additional storage water would be dependent on flow and water supply conditions and would be determined by a management team consisting of representatives from Reclamation, the Yakama Nation, irrigators, and fish agencies.



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SOURCE: Anchor Environmental, 2009.

Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure 2-4
Bumping Lake Expansion Map
Washington

Large option – 458,000 acre-feet

The large option is for an increase in storage of approximately 420,000 acre-feet to a total storage volume of 458,000 acre-feet. The large option was previously evaluated in the Bumping Lake Enlargement Joint Feasibility Report (Reclamation and USFWS, 1976) and Yakima River Basin Storage Alternatives Appraisal Assessment (Reclamation, 2006). The large option consists of constructing a 230-foot-high rockfill dam approximately 4,500 feet downstream of the existing Bumping Lake Dam. The reservoir surface area would be 4,120 acres. Reclamation performed hydrologic modeling of the potential effect of the large Bumping Lake on irrigation water supply and instream flows if the project were integrated into existing operations. Their conclusion was that the large Bumping Lake helps meet irrigation water supply goals in all years except during the last year of a 3-year drought. They also determined the reservoir would impact the Bumping River and Naches River hydrographs by decreasing and shifting the timing of flows in spring. Even though the project would partially meet irrigation water supply goals and meet municipal water supply goals, Reclamation did not carry forward the alternative in their Water Storage Feasibility Study because of the flow impacts and other potential environmental impacts.

For this study, the operating requirements for the reservoir are assumed to be different than those considered by Reclamation in the Yakima River Basin Storage Alternatives Appraisal Assessment (Reclamation, 2006). Water stored for irrigation would be used only during years when prorationing serious reduces available supplies. Water stored for fish benefits would be used to provide additional stream flow in the Bumping, Naches, and Yakima Rivers and more flexibility in operations of the other Yakima Project reservoirs as described in “Modification of River Operations in Conjunction with Naches River Storage” below.

Differences between the proposed operations and Reclamation’s proposed operations of an expanded Bumping Lake are summarized in Table 2-1.

Table 2-1 Bumping Lake Expansion Operation Differences

Reclamation	Integrated Water Resource Management Alternative
Main purpose to maximize storage carryover for irrigation use in dry water supply years	Portion of storage carried over for irrigation use in drought water supply years
Releases beyond minimum requirements for fish/habitat purposes not part of expanded Bumping Lake strategy	Portion of storage space solely for fish/habitat purposes for use during drought water supply years
No change to minimum instream flow requirement for Bumping River	Increased minimum instream flow requirements during spring for Bumping River

Small option – 200,000 acre-feet

The small option is for an increase in storage of approximately 200,000 acre-feet. This option was previously evaluated by Reclamation in its Planning Design Summary

Bumping Lake Enlargement Dam (Reclamation, 1985). This option would be similar to the large option, but would be able to store less water and would provide less benefit to irrigation and fish, although its cost would also be less and it would have fewer potential impacts. This small option has not been evaluated in much detail and existing documents; therefore, its analysis in this programmatic EIS is limited. Additional evaluation would be conducted if the option is carried forward.

The small option was evaluated by Reclamation in 1985, but no additional study or modeling has been done on that option. The smaller option would have a footprint of approximately 3,500 acres. As shown in Figure 2-4, the footprint of the smaller option would not be appreciably less than the large option because of the steep valley walls.

Modification of River Operations in Conjunction with Naches River Storage

Currently the Yakima River reservoirs are operated to provide spawning and incubation flows, outmigration pulse flows and flushing flows, target flows and diversion entitlements downstream from the dams, and meeting YRBWEP flows at Sunnyside and Prosser Diversion Dams. Under the current "flip-flop" operating conditions, water is released from Cle Elum Lake as the primary water source for lower valley irrigation and water is stored in Rimrock Lake during most of the irrigation season. This results in relatively high flows in the upper Yakima River and low flows in the Tieton River and lower Naches River in the irrigation season. In the fall Reclamation shifts operations by significantly reducing flows out of Cle Elum Lake and increasing flows out of Rimrock Lake in the Naches River basin, the flows decrease in the upper Yakima River and increase in the Tieton River and lower Naches River. This flip-flop regime was devised in response to a court order to protect spring Chinook salmon redds in the upper Yakima and Cle Elum Rivers. However, the current flow regime, along with flow releases to meet peak irrigation demand, result in high flows in the mainstem Yakima River down to the Sunnyside Diversion Dam throughout most of the summer. It has been suggest that this may be significantly reducing the rearing capacity for juvenile salmonids.

Construction of additional storage in the Naches River basin may provide the opportunity to modify operation of the Yakima Project to better meet fish needs. However, these benefits may come with a potential cost to the Bumping River and Naches River flow regime by increasing the level of regulation in these rivers, which have a relatively unregulated flow regime. Any operational changes will need to consider the competing flow conditions and flow timing requirements for migrating, spawning, incubating, and rearing salmonid species in Yakima River basin streams. Examples of how additional storage in the Naches River basin could be used to benefit fish include:

- Increasing winter and spring flow in the Bumping, Naches and Yakima Rivers during droughts;
- Reducing September flows in the Tieton River;
- Increasing summer flows in the Yakima River below Parker gage; and
- Adding pulse flows when needed in the winter or spring.

2.3.4.2 Wymer Reservoir

Reclamation and Ecology evaluated constructing an off-channel storage reservoir on Lmuma Creek in the January 2008 Draft Planning Report/EIS. The proposed Wymer reservoir alternative that was evaluated included a 450-foot-high dam on Lmuma Creek with a storage capacity of 162,500 acre-feet filled by pumping from the Yakima River using a 420 cfs capacity pump station. This alternative was presented in detail in the January 2008 Draft Planning Report/EIS and will not be discussed further. Reclamation decided not to pursue the alternative because the benefits did not outweigh the costs and impacts. Specifically, the costs of pumping water from the Yakima River upstream to the reservoir were considered too high. However, Ecology thinks that the Wymer reservoir option should continue to be considered because it provides opportunities not provided by other storage options because of its location in the middle basin. Specifically, Wymer could be:

- Used in conjunction with upper basin fish projects to prevent any potential loss of TWSA;
- Used to store runoff in winters where prolonged thawing conditions create high flow conditions in mid-winter;
- Used to improve the flexibility of water management in the event that climate change increases the frequency of mid winter runoff events.

This Supplemental Draft EIS considers an alternative of filling the same reservoir via gravity flow through either an expanded KRD system or a separate set of canals or pipes. Water would be directly supplied to the new or expanded conveyance system from a new pump station on the Yakima River near Thorp or directly from Cle Elum Dam in order to bypass parts of the Cle Elum and Yakima Rivers.

The alternative routes for water conveyance through the KRD system have not yet been studied in detail. The selection of a conveyance route would require in-depth coordination with KRD and potentially significant modifications to KRD infrastructure. The following alternative routes are proposed. These potential routes would require additional study prior to determining their feasibility.

Thorp to Wymer Option

For this option, a pump station would be constructed near Thorp which would pump water to an expanded KRD North Branch Canal or a separate pipeline generally following the route of the North Branch Canal. The canal or pipeline would deliver water to the Badger Pocket area south of Ellensburg, where a 3.6-mile-long tunnel would be constructed through Manastash Ridge to a point above Wymer reservoir. The KRD North Branch Canal would need to be enlarged to provide capacity to feed Wymer Reservoir. Approximately 35.4 miles of the North Branch Canal, and 8.6 miles of the Turbine Ditch would need enlarging as well as 11 siphons and tunnels. The capacity of the KRD North Branch Canal would be enlarged by 500 to 1,000 cfs depending on how much flow will be fed into Wymer reservoir. The hydraulic capacity of this option would be greater than the alternative studied in the January 2008 Draft Planning Report/EIS which had a pump station with a capacity of 420 cfs that would operate only in the winter and spring.

This option would fill Wymer reservoir in the winter and spring and also convey flow around the reach of the Yakima River from Thorp to Wymer during summer. This would reduce the high summer flow currently affecting the upper Yakima River. The KRD North Branch Canal supply could also be provided by the pump station, providing more flexibility in the operations of the upper Yakima reservoirs and improve the reliability of the KRD Canal.

This option, although requiring a large pump station near Thorp, would recover energy through a hydroelectric plat at the outlet of Wymer Dam. The energy produced at Wymer Dan should approximately offset the energy required at the pump station at Thorp because of the greater pressure head present at Wymer Dam. The estimated pumping head at Thorp is 360 feet while the estimated generating head at Wymer Dam is 475 feet.

South Branch Option

For this option, a 6-mile-long canal from Cle Elum Dam would be constructed with a 1.4-mile-long siphon crossing the Yakima River to the KRD Main Canal. Approximately 14.8 miles of the Main Canal would need to be enlarged, as well as 18 miles of the South Branch Canal and 9 siphons and tunnels. A new 13-mile-long siphon from the end of the KRD South Branch Canal and a 3-mile-long tunnel under Manastash Ridge would be needed to deliver water to Wymer reservoir. The capacity of the KRD canals would be enlarged by 500 to 1,500 cfs depending on how much flow will be fed into Wymer reservoir.

This option could also generate electricity at Wymer Dam and would have lower operation and maintenance costs than the Thorp to Wymer option since no pump station would be required. However, the capital costs would be higher.

Pipeline Option

This option of filling Wymer Dam consists of installing a pipeline conveyance system between Cle Elum Dam and Wymer Dam. The pipeline system would be sized to convey the same flow as the other filling options. The pipeline system would begin at Cle Elum Dam and follow the east side of the Cle Elum River towards Cle Elum. The pipeline system could follow a route on the north side of Cle Elum and connect back to Highway 970 east of Cle Elum. The pipeline route could then generally follow Highway 970 to Highway 10 and Highway 10 to Ellensburg. South of Ellensburg, the pipeline system would be routed to the east along Thrall Road to the location of a tunnel under Manastash Ridge connecting the pipeline system to Scorpion Coulee Creek, a tributary to Wymer reservoir.

The advantage of using a pipeline system instead of a gravity system is its ability to operate during the winter and fill Wymer Reservoir outside of the normal operating period of the KRD canals (mid-April to mid-October). Approximately 45.9 miles of pipeline would be required along with crossings of the Teanaway River, at least 11 creek crossings, two interstate crossings (I-90 and I-82 near Ellensburg), and five canal crossings (including the three KRD canals in Badger Pocket). A pipeline conveyance system that conveys 500 cfs would require two 8-foot-diameter pipes; a system that conveys 1,200 cfs would require two 12-foot-diameter pipes. The pipeline conveyance system would need to be pressurized because the route varies in elevation, making a gravity system more difficult and costly to construct. This option could convey flow year-round, which would provide additional flexibility in the operations of the upper Yakima River reservoirs and provide the opportunity to increase or decrease flows in response to fish needs in the Yakima River. Impacts to flow would occur especially in winter and spring.

This option could also generate electricity at Wymer Dam and would have lower operation and maintenance costs than the Thorp to Wymer option since no pump station would be required. However, the capital costs would be higher.

Modification of River Operations in Conjunction with Wymer Reservoir

Construction of Wymer reservoir could provide opportunities for Reclamation to modify operations of reservoirs to reduce impacts to fish. The additional storage at the Wymer location could allow reservoirs in the upper Yakima basin and Naches basin to be operated to provide water at critical times for fish. See Section 2.3.4.1 for additional information on potential uses of storage water to benefit fish.

2.3.4.3 Tributary Storage Surrogate: Ahtanum Creek Watershed Restoration Program, Including Pine Hollow Reservoir

This alternative would not provide any significant benefit to flows in the Yakima River. However, Ahtanum Creek, like many other tributaries of the Yakima River, would not benefit from mainstem focused water supply projects. It is included here as an example of how flow, passage, and habitat problems in a tributary basin could potentially be addressed.

The Ahtanum Creek Watershed Restoration Program, including construction of Pine Hollow reservoir, was presented as Alternative 2 in Ecology’s Final Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005a). At this time, there is no consensus among the Yakama Nation, Ahtanum Irrigation District, and other basin stakeholders to proceed with the Pine Hollow project. This option would create a coordinated watershed program with storage reservoir, agricultural conservation, and habitat restoration elements. The Pine Hollow reservoir would not provide benefits to the basin’s Total Water Supply Available (TWSA), but would improve irrigation delivery and salmonids habitat in the tributary. Similar projects could be constructed on other tributaries, but those alternatives have not yet been studied.

Pine Hollow Reservoir is a proposed offsite reservoir near Ahtanum Creek approximately 15 miles east of Yakima between Tampico and Wiley City. The dam would be 180 feet high with a total storage capacity of 24,000 acre-feet. The permanent pool would be 2,000 acre-feet. Operational characteristics include using the reservoir to provide out-of-stream water use for the irrigation season, removing all individual creek diversions within the reservoir service area, providing flow augmentation of Ahtanum Creek via the reservoir, delivering reservoir water through a piped system, evaluating the maintenance of flows in Bachelor and Hatton Creeks, and diverting reservoir water through the Johncox Ditch to meet instream flow targets.

Conservation measures in the Ahtanum Creek Watershed Restoration Program could include lining and piping of conveyance systems, developing conservation plans, water metering, system automation, and on-farm system improvements. Habitat restoration measures could include fish screening, riparian restoration and enhancement, increased stream and wetland buffers, stream bank stabilization, property acquisition, floodplain restoration, adding channel roughness, bridge and road improvements, fencing of riparian areas, erosion control, higher development standards, pesticide and herbicide reduction programs, public education, and fish passage improvements.

2.3.5 Ground Water Storage Element

The Ground Water Storage Element proposes to use surface water to recharge (replenish) aquifers and the natural storage capacity of geologic formations to store water for later recovery and use. Typically aquifers would be recharged with surface water during high flow periods. The stored water would be used to supply out-of-stream uses, increase stream flows through increased ground water discharge, and/or replenish depleted ground water storage. The source water is expected to be surface water from the Yakima River or one of its tributaries. Water right permits would be required to divert, store, and use water in a reservoir, including an underground geological formation (RCW 90.03.370). See Section 5.2.5.3 of the January 2008 Draft Planning Report/EIS for additional information about water rights requirements for ground water storage. A new water right may not be granted if it would impair existing rights, including Reclamation's water rights for the Yakima Project. New or existing infrastructure (canals or pipelines) would be used to convey water to the recharge site. The availability of water would be a function of seasonal timing and location within the Yakima River basin.

Ground water storage is achieved by recharging water to the deep (confined) and shallow (unconfined) portions of the aquifer system. There are two distinct methods of recharge:

- Injection Recharge (Direct Injection with Active or Passive Recovery). This method injects water via wells and targets deeper confined aquifers. The injected water would be actively recovered via wells or passively recovered through natural discharge to streams.

- Surface Recharge with Passive Recovery. This method distributes water at the ground surface, which then infiltrates to a shallow unconfined aquifer and naturally discharges to streams or springs.

2.3.5.1 Injection Recharge

Injection recharge is a method that injects water via wells into a deep aquifer. The injected water may be recovered actively or passively depending on the objective of the recharge. Aquifer storage and recovery (ASR) is the term used when the stored ground water is actively recovered for potable (municipal) or nonpotable uses. When the storage is allowed to discharge naturally, it is called injection with passive recovery. Both methods of recovery are included in this alternative.

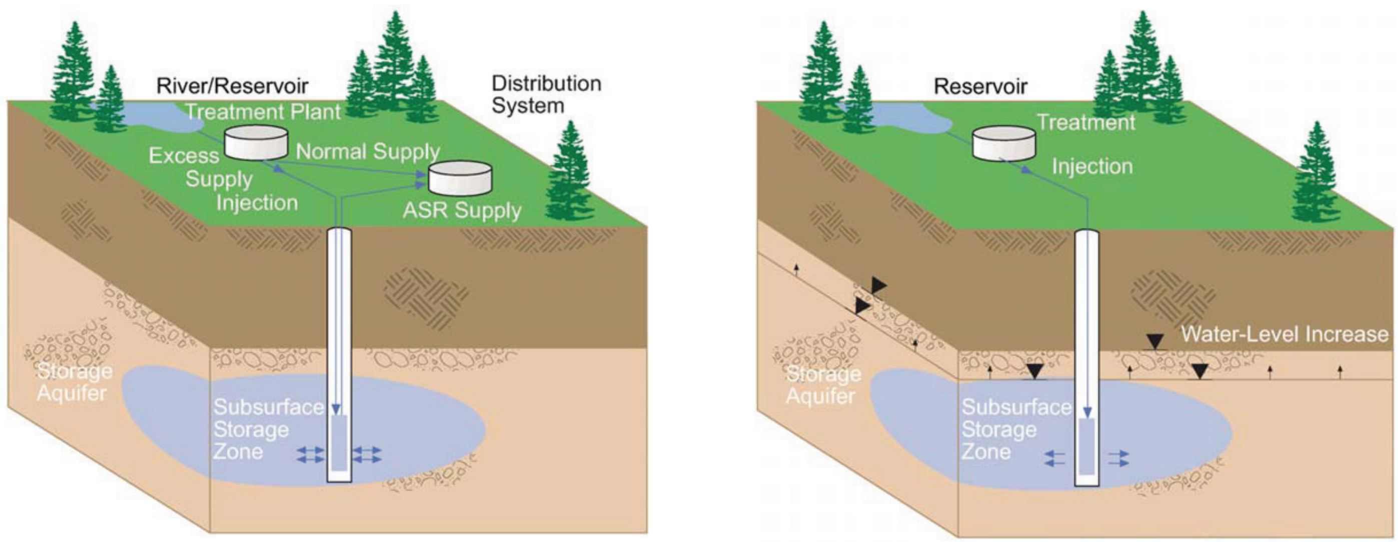
Aquifer Storage and Recovery

ASR systems inject water via wells into aquifers during periods of excess capacity and withdraw the water for municipal supply during periods of peak demand or limited supply. Figure 2-5 shows a typical configuration of an ASR system. In Washington State, ASR systems are regulated under the Washington Administrative Code (WAC) 173-157. Because the source water must meet water quality standards for potable water, the water is obtained from conventional drinking water treatment plants or from ground water wells. ASR systems require recharge/recovery wells and conveyance infrastructure to transport the water from the source to the recharge well, and from the recovery well to the municipal supply.

Injection with Passive Recovery

Direct injection can also be used to store water in the aquifer with passive recovery (Figure 2-5). Under this option, potable water would be injected into an aquifer during periods of excess capacity, but the water would become part of the natural ground water system, remain in the aquifer, and flow to natural discharge areas (i.e., streams or springs). The water would be passively recovered when it reaches the stream and would be available for instream or out-of-stream uses. Injection into a deep aquifer results in a longer lag time (interannual [or more than one year or season] retention) between injection and when the water reaches natural discharge areas. This interannual retention time provides a more constant discharge of recharged water to streams and other discharge areas. Injection to shallower portions of the aquifer system provides shorter lag times between the time of recharge and the time of peak return flows.

Injection with passive recovery would require treatment facilities, injection wells, and conveyance infrastructure to transport the water from the source (similar to facilities needed for ASR). However, no conveyance system would be required to transport water to the place of use.



Municipal Aquifer Storage and Recovery (ASR)

Injection with No Recovery

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SOURCE: Golder Associates, 2007.

Figure 2-5
Injection Recharge

Municipal Aquifer Storage and Recovery

Potential Locations

Candidate sites evaluated for municipal ASR include the cities of Yakima (Ahtanum Valley), Ellensburg (Kittitas Valley) and Kennewick (Lower Valley). Sites evaluated for direct injection with passive recovery include the Black Rock-Moxee Valley and the Lower Yakima Valley immediately downstream of Union Gap. Direct injection of water at the headwaters of the Lower Yakima Valley (i.e., immediately below the Parker gage) could offset the small municipal users throughout the Lower Valley. Water recharged to the Upper Ellensburg Formation by direct injection may be passively recovered by seepage back to streams. Such seepage may be used to mitigate impacts from junior water users by increasing stream flows.

Additional site-specific studies would be required to identify and select specific sites for municipal ASR.

Regional ASR

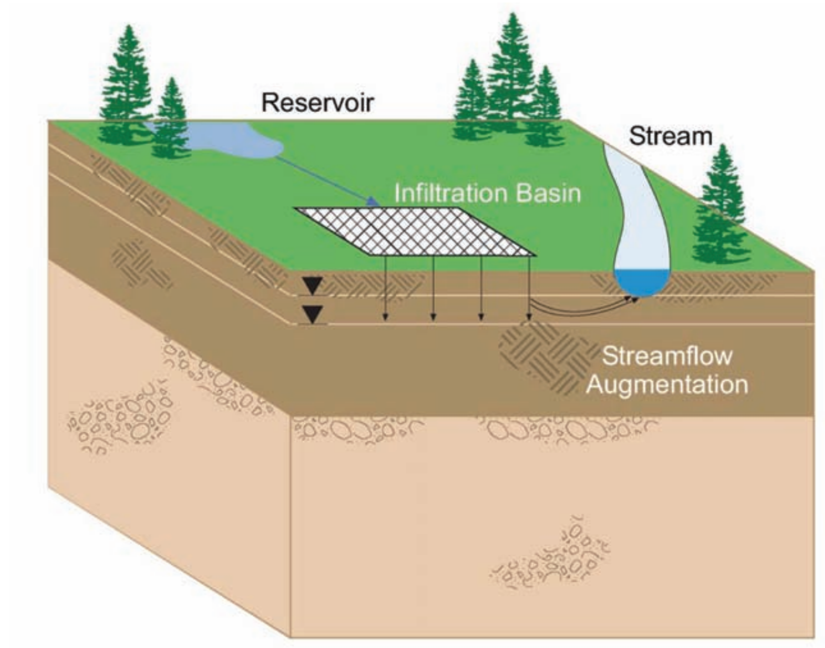
The regional ASR alternative includes ASR for irrigation use and more extensive injection into the Columbia River Basalt Group aquifer system, rather than the clastic (formed from fragmented rock) Ellensburg formation. The basic concept is to capture large volumes of spring runoff prior to the irrigation season and store it in deep basalt aquifers that have high recovery efficiency (i.e., low leakage and sufficient transmissivity to allow high volumes of injection and recovery). The basalts in the Yakima Basin are used for irrigation and a small amount of domestic supply and pumping is depleting these aquifers in some areas. These are conditions that have been shown to be favorable for ASR in places such as Salem, Oregon, where ASR could "refill" some areas of the aquifer system.

Potential Locations

Four areas were chosen to evaluate the feasibility of regional ASR: Kittitas, Roza, Tieton, and Toppenish (Wapato). The locations were identified based primarily on the potential for use of the ASR system to provide irrigation water (rather than municipal) and on the presence of existing conveyance infrastructure. Additional site-specific studies would be required to identify and select specific sites.

2.3.5.2 Surface Recharge with Passive Recovery

Surface recharge with passive recovery involves diverting and infiltrating surface water into a recharge basin during periods of high streamflow and allowing it to discharge naturally back to a stream (Figure 2-6). The natural discharge back to the stream is termed passive recovery because it requires no human intervention to get the water to its intended destination in contrast with active recovery where stored water is physically pumped back to the surface. The infiltration sites would be located so that the timing of return flow to a stream corresponds to periods of low flow. The source of the infiltration water would be direct surface diversion from a river or irrigation canal, or reclaimed water treated to standards for recharge. Surface recharge systems are intended to recharge water before lower streamflow conditions occur.



Surface Infiltration with No Recovery

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SOURCE: Golder Associates, 2007.

Figure 2-6
Surface Recharge with Passive Recovery

Potential Locations for Surface Recharge

Specific sites were not identified for surface recharge locations because of the lack of site-specific hydrogeologic data. Instead a map of the possible locations for sites was developed that could be further screened with more site-specific data. A detailed discussion of the methods and analysis are provided in the Technical Report on the Groundwater Storage Alternative (Ecology, 2009a). The specific number of surface recharge facilities has not been determined, but could range from more than 30 small basins to less than 10 larger basins.

The surface recharge facilities would be located in the shallow alluvium and unconsolidated sediments in the Yakima River basin to maximize aquifer storage and transmission of groundwater. Surface recharge facilities may require conveyance facilities to move water from the source to the infiltration basin. Pumping may be required to move the water through the canal system if a gravity canal system is not feasible.

2.3.6 Fish Habitat Enhancement Element

Anadromous and resident fish would benefit from habitat enhancements such as reconnecting floodplains, reestablishing side channels, restoring natural river and riparian conditions, and acquiring habitat for protection. This element includes proposals for habitat improvements on both the mainstem and the tributaries in the Yakima River basin. The habitat enhancements would provide greater benefits when integrated with the flow and fish passage improvements described in the previous sections.

2.3.6.1 Yakima and Naches Rivers

Habitat protection, restoration, and enhancement projects are proposed for the Yakima and Naches Rivers. The projects included in this element are based on projects identified in the Yakima Steelhead Recovery Plan (YBFWRB, 2008).

Proposed project types include:

- Reconnecting side channels and off-channel habitat to stream channels;
- Restoring wet meadows;
- Reconnecting floodplains to river channels;
- Relocating or improving floodplain infrastructure and roads;
- Placing stable wood and other large organic debris in stream banks;
- Restoring natural channel form;
- Restoring natural riparian vegetative communities; and
- Developing grazing strategies that promote riparian recovery.

Priority projects for specific reaches are described in the following sections.

Yakima River

Keechelus Dam to Roza Diversion

Spawning and rearing habitat in the mainstem of the upper Yakima River has been reduced as a result of channel confinement and the associated loss of high-flow refuge sites and spawning gravels. Efforts to restore floodplain connectivity and reestablish side channel connections through levee setbacks and other infrastructure changes will increase effective habitat area in the upper Yakima River. Proposed habitat protection, restoration, and enhancement actions in the upper Yakima River and its tributaries would be integrated with ongoing habitat actions and water storage/irrigation diversion improvement efforts. Priority projects proposed for this reach include:

- Reconnection of the Interstate 90 ponds at mile 101;
- Reclamation's Schaake levee pullback near Ellensburg;
- Restore sites associated with the Interstate 90 improvements above Easton;
- Actions throughout the reach that target opportunities to set back abandoned railroad levees and flood control levees on public lands;
- Protect and restore floodplain, riparian, and in-channel habitats; and
- Set back other levees in the area.

Additional funding is necessary to fully implement the protection of key floodplain and riparian reaches where there are willing landowners. Land acquisition and conservation easements implemented with the goal of protecting key fish habitat in upper Yakima River reaches and tributaries would include a land management element to maintain the existing level of habitat function. Acquisitions and easements would also include a restoration element where appropriate. Habitat restoration actions and management across ownerships would be integrated with the acquisition and conservation easement programs. The Yakima Steelhead Recovery Plan (YBFWRB, 2008), and the Yakima River Side Channels Project contain more detail regarding proposed habitat improvement projects in this reach.

Roza Diversion to Prosser Dam

Conditions in the middle Yakima River play a major role in migration timing for adult salmonids and survival of out-migrating smolts and winter juvenile rearing. Protecting and restoring mainstem and off-channel habitats (especially those that provide refuges from high temperatures) are critical for these life stages. Work would include protecting habitat through acquisition, easements or cooperative agreements, and activities such as riparian plantings, reconnecting side channels, and winter irrigation to saturate floodplains. The Upper Yakima Comprehensive Flood Hazard Management Plan (Yakima County, 2007) along with the Yakima Steelhead Recovery Plan (YBFWRB, 2008) and the Yakima River Side Channels Project contain more detail regarding proposed habitat improvement projects for this reach.

Priority projects proposed for this reach include:

- Restore floodplain function via the proposed Gap to Gap dike setback and associated projects;
- Protect and restore mainstem and floodplain habitats below Sunnyside Dam with an emphasis on restoring floodplain function in the Wapato reach where instream flows are not currently limited by severely altered flow and temperature regimes;
- Protect and restore mainstem and off-channel habitats between the Toppenish and Satus Creek confluences;
- Improve flows below Parker through irrigation system improvements; and
- Restore the gravel pits and Taylor ditch in the Selah area to more pre-development conditions.

Prosser Dam to Columbia River Confluence

The Yakima River Side Channels Project (implemented by the Yakama Nation under continuing BPA Fish and Wildlife Council funding), the Lower Naches Comprehensive Flood Hazard Management Plan (Tetra Tech/KCM, 2005), and the Yakima Steelhead Recovery Plan (YBFWRB, 2008) contain more detail regarding proposed habitat improvement projects for this reach.

Priority projects proposed for this reach include:

- Protect and restore mainstem and off-channel habitats, particularly in floodplain reaches and documented cool water refuge areas; and
- Improve flows via irrigation system improvements (e.g., KID (Section 2.3.3.2) and Benton pump exchange proposals).

Several generic habitat projects were referred to in the Steelhead Recovery Plan for the Yakima River area below Sunnyside Dam, but no specific projects were identified (YBFWRB, 2008). Currently, the Benton County Conservation District is funded by the SRFB to develop a Draft Lower Yakima Assessment which will provide a detailed analysis of habitat conditions and a list of recommended restoration projects for the Lower Yakima area (Conley, 2009b). Projects identified through this process could be implemented in the future as part of the fish habitat enhancement element of the Integrated Water Resources Management Alternative.

Naches River

Bumping Dam to Tieton River Confluence

Above the confluence with the Tieton River, Naches River flows are the least regulated of all the large rivers in the Yakima basin. Protecting functional habitat in the mainstem Naches and its floodplain upstream of the Tieton confluence is a priority. It would involve a combination of acquisitions, conservation easements, and cooperative agreements. Habitat restoration opportunities also exist in the upper Naches River reaches. Riprapped dikes, road embankments, and revetments confine the channel in places, cutting off historic side channels and spring brooks and reducing floodplain function. The Yakima Steelhead Recovery Plan (YBFWRB, 2008) contains more detail regarding proposed habitat improvement projects for upper Naches River reaches.

Priority projects proposed for this reach include:

- Protect habitat in Naches River mainstem upstream of the Tieton River confluence;
- Protect habitat in the Oak Flats and Nile areas; and
- Restore historic off-channel habitat by increasing floodplain function where feasible.

Tieton River Confluence to Yakima River Confluence

Confinement of the lower Naches River has reduced sediment transport efficiency, causing excessive accumulations of sediment upstream and channel downcutting downstream. Levees and dams located in the lower end of the alluvial valleys further reduce the amount of salmonid rearing habitat. Improving sediment transport by modification of the dam structure and levee reconfiguration would improve habitat availability over the long term. The Upper Yakima Comprehensive Flood Hazard Management Plan (Yakima County, 2007), the Yakima Steelhead Recovery Plan (YBFWRB, 2008), the Yakima River Side Channels Project, and the Lower Naches Reach Coordination Project Plan (Calvin et al., 2005) contain more detail regarding proposed habitat improvement projects in this reach.

Priority projects proposed for the lower Naches River are:

- Protection and restoration of complex floodplain habitats (e.g., across from Naches Wonderland within and downstream of Eschbach Park and Buckskin Slough); and
- Improve floodplain function and sediment transport by modifying Nelson and Gleed diversion dam structures and reconfiguring levees such as near Eschbach Park/Yakima Water Treatment Plant and the Powerhouse Road crossing.

2.3.6.2 Tributary Habitat Improvements

Habitat improvement in tributaries of the Yakima River could provide substantial benefits to salmonids. Habitat improvements include protecting, restoring, and enhancing channel and floodplain connectivity, riparian habitat, fish passage, instream flows, and instream channel complexity. Specific activities include protecting and planting riparian vegetation, placing large woody debris and engineered log jams in stream channels, reshaping banks and reconnecting side channels to improve floodplain function, restoring fish passage at man-made barriers, screening water diversions and securing commitments to increase instream flows.

Tributaries throughout the basin provide much of the spawning and rearing habitat for anadromous fish. In addition, because of the effects of flow regulation and artificial confinement of many reaches of the Yakima and Naches Rivers, the lower ends of tributaries provide important rearing habitat for juveniles originating from mainstem reaches. Reecer, Currier, Whiskey, Mercer, Wilson, Naneum, Coleman, Cherry, Manastash, Taneum, Swauk, Lmuma, Cowiche, Ahtanum, Toppenish, and Satus Creeks, the Bumping and Teanaway Rivers, and others are all candidates for habitat enhancements.

Table 2-2 summarizes proposed habitat improvements for specific tributaries. Development of this option is based on projects identified in the Yakima Steelhead Recovery Plan (YBFWRB, 2008).

Table 2-2 Tributary Habitat Improvements

Tributaries	Project Types					
	Fish Passage	Instream Flow Improvement	Floodplain/Side Channel Reconnection	Riparian Habitat Enhancement/ Restoration	Channel Complexity (Large woody debris, channel reconstruction, boulders, etc.)	Diversion Screening
Big Creek		X				
Cle Elum River			X	X	X	
Teanaway River		X	X	X	X	
Swauk Creek	X	X	X	X	X	X
Taneum Creek	X	X		X		
Jack Creek	X		X	X	X	
Indian Creek	X					
Manastash Creek	X	X		X		X
Reecer Creek	X		X	X	X	X
Wilson/Naneum Creeks System[1]	X	X		X	X	
Bumping River				X	X	
Nile Creek		X	X	X	X	X
Rattlesnake Creek		X	X	X	X	X
Tieton River			X	X	X	
Cowiche Creek	X	X	X	X	X	X
Little Naches River			X	X	X	
Ahtanum Creek[2]	X	X	X	X	X	X
Toppenish Creek		X	X	X	X	X
Satus Creek		X	X	X	X	

[1] Includes Wilson, Naneum, Coleman, Cherry Creeks which are all interconnected.
[2] Includes North and South Forks and Wide Hollow Creek.

2.3.7 Enhanced Water Conservation Element

The Enhanced Water Conservation Element is an aggressive program of water conservation measures to improve basin water supply without constructing additional large water storage reservoirs. The alternative includes conservation measures for irrigation district infrastructure improvements, on-farm conservation and irrigation efficiency improvements, municipal conservation, and commercial and industrial conservation. This element includes:

- Agricultural water conservation measures that would be implemented under the Yakima River Basin Water Enhancement Program (YRBWEP).

- Agricultural water conservation projects outside Reclamation's Yakima Project and municipal, industrial, and commercial conservation projects.

Agricultural water conservation measures include lining or piping existing canals, automating canals, constructing reregulating reservoirs on irrigation canals, improving water measurement and accounting systems, installing on-farm water conservation improvements and other measures. Municipal, commercial, and industrial conservation measures include improvements to infrastructure, household conservation programs, changes in commercial and industrial practices, and the use of reclaimed water.

Conservation programs implemented under YRBWEP allocate two-thirds of the conserved water resulting from a conservation measure to instream flows with one-third of the conserved water retained by the implementing entity for irrigation use. It is assumed that the two-thirds portion remains in the river from the implementing entity's point of diversion to the last point of operational discharge from its water delivery system. Under YRBWEP, two-thirds of the implementation cost of conservation measures will be federally funded by Reclamation, and one-third will be funded equally by a non-federal entity (Ecology) and the implementing entity. A "cost ceiling" was established for the federal funds of $67.5 million (in 1990 dollars) and is subject to increase by applicable cost indices. (The 2007 Federal cost ceiling is $115 million.)

The Enhanced Water Conservation Element considers two options for the allocation of conserved water to provide further incentives for conservation:

- Two-thirds of the conserved water would be retained by the implementing entity for irrigation or municipal and industrial use, while one-third is assumed to remain in the river from the implementing entity's point of diversion to the last point of operational discharge from its water delivery system; or

- All of the conserved water would be retained by the implementing entity for irrigation or municipal and industrial use.

For the Enhanced Water Conservation Element, it is assumed that at least two-thirds of the implementation cost would be funded by Ecology without federal funds, with the remainder funded by the implementing entity. No specific cost ceiling has been established for the Enhanced Water Conservation Element. For this analysis it was assumed that conserved water would become part of the TWSA to be managed by Reclamation for all water users. The assignment of benefits of conserved water will likely depend on the funding source and will be determined during the implementation phase.

2.3.7.1 Consumptive versus Nonconsumptive Use of Water

Consumptive and nonconsumptive uses are important considerations in water conservation programs, water transfers, and water markets and banking. For any use of water, a portion of the water withdrawn is consumed or lost to further use. Defining consumptive use is an important consideration for the Enhanced Water Conservation and the Market-Based Reallocation of Water Elements.

For a use of water involving a diversion from a source, a portion of the water withdrawn is consumed or lost to further use, primarily through evaporation. Examples of consumptive use within irrigation delivery systems include evaporation from open canals and drains, and evapotranspiration (ET) from vegetation growing along canal banks. For on-farm water use, consumptive use includes crop ET, evaporation of water sprayed into the air (spray evaporative loss), evaporation from the plant canopy (canopy loss), and water blown off of the irrigated property (wind drift) (Ecology, 2005d).

A nonconsumptive use is defined by Ecology regulation as water that is not diverted from a source or that is diverted and used without diminishment of the source. Examples of nonconsumptive uses include seepage and return flow from an irrigation canal and percolation from farmlands where water in excess of ET is applied to fields. An example of a nonconsumptive use when water is not removed from the source is hydroelectric generation at a dam.

A water use may also be consumptive to a specific reach of a stream when water is diverted, used, and returned to the same source at a point downstream that is not in close proximity to the point of diversion. The segment of the stream between the point of withdrawal and the point of discharge is called the bypass reach. An example is a hydroelectric project that diverts the source into a canal that carries the water to a generating station, and then returns it to the source some distance downstream.

The consumptive and nonconsumptive portions of a water right are important when determining how much water can be transferred or reallocated from a water conservation or water transfer project. Ecology has published guidance on determining irrigation efficiency and crop consumptive use (Ecology, 2005d). Typically the consumptive use portion of a water right can be transferred or reallocated from one water user to another within the Yakima River basin with conditions as to the location of transfers, effect on streamflow, and operations of the Yakima Project.

Transfers of the nonconsumptive portion of a water right is more difficult because each must be "water budget" neutral, that is, it must not increase consumptive use (unless offset by other water provided). In addition, each transfer cannot impair water rights, including instream flow water rights, in the bypass reach between the locations of the original and new points of diversion.

Most of the projects proposed for the Enhanced Water Conservation Element involve reducing seepage and return flow which are nonconsumptive uses of water when viewed in terms of the entire river basin. They are consumptive uses when viewed reach by reach. Only a small amount of the water that will be conserved can be attributed to consumptive uses. However, the Yakima Project has some flexibility in its operation and can allow some redistribution of water within the basin. The challenge is balancing the reduced seepage and return flow from conservation projects with the potential effects on downstream water users and instream flows. For that reason, water conservation projects in lower basin locations such as Roza Irrigation District, Sunnyside Valley Irrigation District, and Wapato Irrigation District may be the focus for water conservation as long as projects to mitigate for reduced streamflow and water supply and to improve water quality below the Parker gage are completed.

2.3.7.2 Enhanced Water Conservation Projects

Agricultural water conservation measures included in the Enhanced Water Conservation Element have been identified in currently published Water Conservation Plans or other documents prepared by irrigation districts, conservation districts, or State and Federal entities. Specific projects are listed in the following tables. Table 2-3 provides a list of potential water conservation projects for water users that divert from the Yakima River, Table 2-4 provides a list of potential water conservation projects for water users that divert from the Naches River. Additional water conservation opportunities have been identified and are described in the Technical Report on the Enhanced Water Conservation Alternative prepared for the January 2008 Draft Planning Report/EIS (Ecology, 2007c). Not all potential conservation projects were analyzed in this report as the RiverWare model used to analyze the potential improvement works only with mainstem water users along the Yakima and Naches Rivers. The effect of water conservation projects on tributary flows and subsequently the mainstem Yakima and Naches Rivers were not analyzed. However, the volume of water represented by the additional conservation projects is small compared to the volumes shown in Tables 2-3 and 2-4 and would not change the findings of this report.

The Enhanced Water Conservation Element assumes that the conservation measures would be funded through State and Federal sources as well as local sources.

The KID Pump Exchange Project, although described in Section 2.3.3.2 as a structural change to an existing facility, was included in the list of Enhanced Water Conservation projects and was analyzed with the hydrologic model.

Table 2-3 Conserved Water Resulting from Enhanced Water Conservation Measures – Yakima River Water Users

Entity	Action	Conserved Water					
		Flow (cfs)			Volume (acre-feet)		
		Seepage	Reduced Spill	Total	Seepage	Reduced Spill	Total
Kittitas Reclamation District	Lining/Piping	5.5		5.5	2,000		2,000
Westside Irrigation	Lining/Piping	1.7		1.7	600		600
Westside Irrigation	On-farm Conservation	9.1		9.1	3,300		3,300
Ellensburg Water Company	On-farm Conservation	19.6		19.6	7,100		7,100
Cascade Irrigation District	On-farm Conservation	24.8		24.8	9,000		9,000
Cascade Irrigation District	Variable Pump Installation and Tailwater Reuse		5.8	5.8		2,088	2,088
Bull Canal Company	Lining/Piping	1.8		1.8	639		639
Bull Canal Company	On-farm Conservation	1.9		1.9	680		680
Union Gap Irrigation District	Automation		0.6	0.6		200	200
Wapato Irrigation Project	Lining/Piping	101.4		101.4	36,800		36,800
Wapato Irrigation Project	On-farm Conservation	89.5		89.5	32,500		32,500
Wapato Irrigation Project	Automation		40.5	40.5		14,700	14,700
Wapato Irrigation Project	Storage/ Reregulation					700	700
Sunnyside Valley Irrigation District	Lining/Piping	11.7		11.7	4,265		4,265
Kennewick Irrigation District	Pump Exchange			178			64,500
Kiona Irrigation District	Lining/Piping	41.2		41.2	439		4,124
Columbia Irrigation District	Lining/Piping and Pump Exchange	111.4		111.4	40,400		40,400

Table 2-4 Conserved Water Resulting from Enhanced Water Conservation Measures – Naches River Water Users

Entity	Action	Conserved Water					
		Flow (cfs)			Volume (acre-feet)		
		Seepage	Reduced Spill	Total	Seepage	Reduced Spill	Total
Nile Valley Ditch Association	Lining/Piping	1.1	-	1.1	395		395
Naches-Selah Irrigation District	Lining/Piping	23.9	-	23.9	8,675		8,675
South Naches Irrigation District	Lining/Piping	26.8	-	26.8	9,733		9,733
Gleed Ditch Company	Lining/Piping	0.3	-	0.3	100		100
Yakima Valley Canal Company	Lining/Piping	1.4	-	1.4	500		500
Naches and Cowiche Canal Company	Lining/Piping	1.7	-	1.7	600		600

Additional water conservation projects have been identified but not analyzed for this report. The largest potential project is a pump back project on the lower Yakima River where water would be pumped into the lower Sunnyside Valley Irrigation District or Roza Irrigation District canals. This project may be feasible because of the increased instream flow present from implementation of the YRBWEP and the reduced diversions by Kennewick Irrigation District and Columbia Irrigation District for the projects shown in Table 2-3. If feasible, the project may supply up to 200 cfs (72,000 acre-feet on an annual basis) back to Sunnyside Valley Irrigation District or Roza Irrigation District. The project was not further analyzed at this time because of uncertainty of impacts to fish in the lower Yakima River. Further study of the feasibility of the project is recommended prior to selecting conservation projects to implement.

2.3.8 Market-Based Reallocation of Water Resources Element

The Market-Based Reallocation of Water Resources Element proposes to reallocate water resources through a water market and/or water bank to improve water supply in the Yakima River basin. The element intends to:

- Increase the overall value of the goods and services derived from the basin's water resources, by reallocating water from low-value to high-value uses;
- Reduce the delay and cost of transactions that reallocate water resources; and
- Ensure that, before transactions are completed, appropriate consideration is given to the potential impacts on third parties.

This alternative proposes both water marketing and water banking options to facilitate water transfers and reallocate water resources. There is no one accepted definition of water markets or water banking. For the purposes of this alternative, the term "water market" refers to an institutional process designed to facilitate the voluntary transfer of water rights from a willing buyer to a willing seller on a permanent or temporary basis. The term "water bank" means an institution designed to (1) accept deposit of a water use entitlement, which will not be used by the water right owner during the time it is in the bank, and (2) make the entitlement available for withdrawal by the water right owner/depositor or another entity (Mentor and Morin, 2007).

The primary difference between a water market and a water bank is that in a water market, a water right holder is seeking a direct transaction with someone who wants to buy or lease his or her water. In a water bank, a water right holder deposits the water right into the bank on a permanent or temporary basis, and the bank makes the water available to a third party. The transactions in a water bank are between the water right holder and the bank on the one hand, and the bank and the third party on the other hand. The bank may pool water rights deposited by multiple water right holders to make larger blocks of water available for sale or lease. Another important distinction is that water rights listed in a market continue to be used pending a transaction to sell or lease the right. Water rights deposited to a bank are not beneficially used while they are on deposit and therefore, they must be protected from relinquishment.

2.3.8.1 Water Banks and Water Markets in Washington

To date, formal structured water marketing in Washington has been limited. However, purchases and leases of water rights on a permanent or temporary basis do occur regularly throughout the State. Many of the temporary leases are undertaken by non-profit groups such as the Washington Water Trust or Washington Rivers Conservancy to benefit instream flows. Ecology and Reclamation implemented an emergency leasing program in the Yakima River basin during the 2001 drought. In 2003, the Legislature provided authority for water banking in the Yakima River basin using the Trust Water Rights Program (Chapter 90.42 RCW).[1] Under this authority, Ecology conducted reverse auctions in the Yakima Basin in 2005 and 2007.

In 2008, Washington Rivers Conservancy and Kittitas Conservation District, with financial support from Ecology and the Columbia Basin Water Management Program, conducted a reverse auction for Manastash Creek water right holders in the upper Yakima basin. The goal of the auction was to allow willing water right holders to auction part or all of their water rights up to a combined total of 3 cfs for instream flow. All water right holders in Manastash Creek with surface water rights confirmed by the Yakima Adjudication Court were invited to submit bids for the auction. The auction was open for bidding from January 31 to February 19, 2008.

[1] In 2009 the legislature expanded the authority to use the Trust Water Rights Program for water banking statewide. ESSB 5583.

Nine bids were received and Ecology purchased five water rights. The acquired water rights were placed in the Department of Ecology's (DOE) Trust Water Rights Program, where they are dedicated to use for instream flow. The purchased rights will result in a 3 cfs and 935 acre-feet per year improvement in flow in the creek.

Use of the Trust Water Rights Program for Water Banking

Beginning with the 2001 drought, the use of the State's Trust Water Right Program as part of water banking has evolved substantially to meet the needs of existing and prospective water users (Ecology, 2006b). Experience to date indicates that reallocation of existing water rights has taken place in five fairly distinct categories:

- Drought-year transfers of a single season duration;
- Drought-year mitigation banks;
- Leases and purchases for environmental purposes;
- Transfers and mitigation banking for post-1905 domestic and municipal water users; and
- Transfers and mitigation banking for prospective domestic and municipal purposes.

A specific example of the use of the Trust Water Rights Program for transfers and mitigation banking is the January 2009 Water Storage and Exchange Contract between Ecology and Reclamation (Ecology and Reclamation, 2009). This contract is based upon the 2007 Memorandum of Understanding between Ecology and Reclamation (Ecology and Reclamation, 2007). Under the contract, Ecology is to identify parties needing water and the quantity required, and to locate and acquire senior (pre-1905) water rights for mitigation. Ecology is to transfer the acquired water rights to trust and assign the rights to Reclamation. Ecology is then able to issue a permit to the designated water user. In exchange for the trust water right assigned by Ecology, Reclamation stores and makes available to Ecology water for the issued permit. The quantity of water to be stored for such purposes is limited to 1,000 acre-feet annually.

Under the contract, priority is given to domestic and municipal water users with post-1905 water rights or water users who purchase and transfer senior seasonal water rights that qualify for priority processing under the Hillis Rule, WAC 173-152-050. Secondarily, water under the contract may be used to assist water users who acquire a transferred senior water right that requires mitigation. The term of the contract is 40 years, renewable for not longer than 40-year additional terms.

Significantly, Reclamation will not accept assignment of any trust water rights if the effect would be to increase the consumptive use of any water right or impair or reduce Total Water Supply Available (TWSA). It will also decline the assignment if it would impair the Yakama Nation's instream flow water right.

To comply with requirements of the water banking legislation, Ecology prepared reports to the legislature in 2004 and 2006 (Ecology and WestWater Research, 2004; Ecology, 2006b). The 2004 report summarizes the status of water banking in western states and describes the considerations for developing a successful water bank. The 2006 report included a summary of statutory challenges to water banking in Washington.

2009 Amendments to the Trust Water Rights Statute

Some of those statutory challenges were removed by a water banking bill passed by the legislature on April 20, 2009. In Engrossed Senate Bill 5583, "AN ACT relating to the effectiveness of water bank authorization and exchange provisions," the legislature made findings that many watershed groups and programs have considered using the state trust water rights program for water banking purposes. The intent of the legislation is "to provide clear authority for water banking throughout the state and to improve the effectiveness of the state trust water rights program" (Section 1, ESSB 5583).

The legislature made specific findings regarding what water banking can accomplish:

- Provide critical tools to make water supplies available when and where needed during times of drought;
- Improve stream flows and preserve instream values during fish critical periods;
- Reduce transaction costs, time, and risk to purchasers; facilitate fair and efficient reallocation of water from one beneficial use to another;
- Provide water supplies to offset impacts related to future development and the issuance of new water rights; and
- Facilitate water agreements that protect upstream community values while retaining flexibility to meet critical downstream water needs in times of scarcity.

These findings encompass the goals of the Integrated Water Resource Management Alternative and identify water banks as being able to satisfy some of the identified barriers to efficient water right transfers. In an effort to increase the effectiveness of water banks, the legislature amended the trust water right statute, RCW 90.42. The significant changes include:

- Provides express authority to use the trust water rights program for water banking purposes statewide (Section 2(1));
- Protects return flows as part of the total water supply available (Section 2 (2)(a));
- Prohibits the use of water banking for carryover of stored water if that would negatively affect the total water supply available (Section 2(3)(d));
- Provides express authority for the state to acquire ground water rights, as well as surface water rights, to be placed into trust (Section 4(1));
- Requires Ecology to "exercise its authorities under the law" to protect trust water rights (Section 4(1));

- Establishes that the consumptive quantity of a trust water right is equal to the consumptive quantity of the right prior to the transfer into trust. (Section 4(4)(d), 5(5), (9));
- Authorizes water rights leased or donated that have not been used for the previous five years before transfer to trust for which there is a sufficient cause for nonuse, to be placed into trust in a quantity used prior to the period of nonuse (Section 5(10)).;
- Authorizes water rights leased or donated where nonuse is exempt because the right is for power production or municipal supply purposes to be transferred to trust in a quantity based on the historical use of the right (Section 5(11)).

The legislative changes will broaden the geographic scope for using the trust water rights program; provide increased incentive for people to transfer their rights to trust; increase the number of water rights eligible to be transferred to trust, and in the Yakima basin allow Ecology to carry water over from the irrigation season into the fall and winter, expanding the water bank's ability to provide mitigation for negative impacts to existing water rights and fish.

2.3.8.2 Development of Options for the Market-Based Reallocation of Water Resources Alternative

Because the State has limited experience and success with water markets and water banks, Ecology determined that a broad range of options should be considered for the Market-Based Reallocation of Water Resources Element. The options presented in this EIS provide Ecology with the opportunity to evaluate a variety of options for administering and operating water markets or banks. The options include both water markets and water banks.

Ecology developed the options for the Market-Based Reallocation of Water Resources Element using information from the 2004 and 2006 legislative reports and a review of literature on existing water markets in the west. Key considerations in developing the options were elements for administering the market or bank and changes that would be required to existing Washington water law. A detailed report on developing the options is presented in the Technical Report on the Market-Based Reallocation of Water Resources Alternative prepared for the January 2008 Draft Planning Report/EIS.

Development of the Market-Based Reallocation of Water Resources Element considered both the administrative structure of the water market or water bank and issues and concerns specific to implementing such a program in Washington. Both are summarized below and are addressed in more detail in the Technical Report (Ecology, 2009b).

Administrative Structure of Water Markets and Water Banks

There are a variety of administrative considerations in developing water markets and water banks. Considerations include:

- **Organization structure and function**. A key to successful markets is the availability of information. Options for providing information include information clearinghouse, brokerage, and providing technical support. It will be necessary to verify that transactions have occurred in compliance with the terms of the contract.
- **Administrator**. A successful administrator must have the trust of all the users and the expertise to provide the structure and functions of the market or bank.
- **Price**. Because potential buyers and sellers may not know of one another or have enough information about costs, a water market or bank must distribute information regarding the water available for sale or lease, the price attached to each, and details of prior transactions.
- **Who can buy/lease or sell/lease water**. The goal of a water market or water bank will determine who should be allowed to participate. The market or bank can be restricted to those who already hold water rights or could be open to anyone desiring water.

Issues and Concerns with Market-Based Reallocation of Water Resources in the Yakima River Basin

An important element for the success of water markets and water banks is a system that not only allows, but facilitates and encourages water transfers through such mechanisms. In Washington the key issues to facilitate reallocation are:

- **Laws and Rules Governing Transfers of Water Rights**. Transfers of water rights are subject to statutory requirements (RCW 90.03.380) and transfers into and out of the TWRP have additional requirements (Chapters 90.38 and 90.40 RCW). The time to process water right transfers under these requirements is seen as an impediment to successful markets and banks. Streamlining the process may require changes in legislation and agencies rules, policies, and procedures.
- **Who Evaluates the Water Rights Transfer?** Government approval of a water right transfer has been identified as a serious impediment to successful water markets and water banks because of processes that are slow, costly, and burdensome (Ecology, 2009b). In Washington, Ecology evaluates water right transfers. However, until the Yakima River basin adjudication is complete, the Yakima Superior Court evaluates temporary water right transfers. Federal laws and Reclamation water delivery contracts add a layer of complexity.
- **Timing of Evaluation**. In the past, Ecology's review process has slowed the transfer of water rights. Legislation that established a separate review process for new water rights and water rights changes and other administrative changes have reduced the review time. Additional changes could be made to separate the review process for transfers through a water market or bank.
- **Transaction Costs**. Transaction costs include processing time and high transaction costs, which can discourage buyers and sellers. The Yakima Transfer

Working Group has helped reduced some of the transaction costs in the Yakima basin. Improved publicizing of markets and prices could further reduce costs.

- **Third-Party Impacts**. The impacts of water transfers on third parties may present the greatest impediment to successful water markets and banks (MacDonnell, 1995). RCW 90.38.380 requires that a transfer may not impair other existing water rights. Other third-party public interest impacts, such as the viability of a particular industry, are not considered when surface water transfers are evaluated. Ecology could seek legislative changes to require consideration of the public interest in the evaluation of water right transfers.
- **Who Do You Trust?** Lack of trust in the entity administering water markets and water banks is a potential impediment to reallocation, especially when the entity that administers the transfers also regulates water rights. Ecology has acknowledged that some landowners lack trust in the agency (Ecology, 2006b). Ecology may be able to overcome this problem through education and other efforts. Alternatively, non-regulatory entities could provide education on water transfer opportunities, conduct confidential evaluations of water rights, and possibly to administer a water market or water bank.
- **Irrigation Districts and Water Right Transfers**. Irrigation districts play a major role in the allocation of water in the Yakima River basin; they have water rights to the majority of water in the basin. Districts are allowed to make some water transfers within irrigation districts without Ecology approval and may form a Board of Joint Control between districts to allow transfers between those districts. Irrigation districts can prevent the transfer of water outside the district and this has been identified as a barrier to water right transfers. If this is identified as a problem in the Yakima basin, Ecology could seek legislation to establish a “water delivery impairment of financial integrity “ test to the decision criteria..

2.3.8.3 Market-Based Reallocation of Water Resources Alternative Options

Based on the evaluation of potential water markets and water banks presented in the Market-Based Reallocation Technical Report (Ecology 2009b), Ecology is considering two options for implementing water marketing and four options for water banking in the Yakima River basin. Options 1A and 1C are based on existing laws and structures with some suggestions for streamlining and efficiency. Options 1B, 1D, 1E, and 1F call for substantial changes to the existing laws and structures. Options 1E and 1F are options for creating water banks to facilitate transfers within and from irrigation districts. Implementing any one of these options, or some combination of them, would require overcoming potential barriers, such as those described above. Current understanding, however, indicates that barriers may be overcome and each of these options is potentially feasible.

Option 1A: Water Market Using Existing Authority

The Water Market Using Existing Authority Option would bring sellers and buyers together and operate under existing laws and regulations regarding water right transfers with noted changes to improve efficiency. The market would be administered by a private nonprofit entity that would operate solely as a clearinghouse of information about water rights of willing sellers and buyers, such as the location of the water right, the elements of the right including quantity, point of diversion, place of use, purpose of use, season of use, and priority date.

Additional characteristics of the Water Market Using Existing Authority Option include:

- The market would accept a water right for posting based on evidence of confirmation by the Yakima Superior Court through the adjudication. If more than 5 years have passed since entry of the Conditional Final Order for the water right, a water right evaluated by a Certified Water Rights Examiner would be accepted for posting. Legislation would be required to authorize the certification of water rights examiners.
- The administrator would conduct outreach and education regarding the market and opportunities it provides. The administrator would also track all transactions carried out through the market to provide others with information about previous transactions.
- The market would be restricted to buyers/lessees who hold current water rights that do not provide adequate water for the purpose for which they were issued and to those acquiring water for instream flow.
- Prices would be determined by market forces and negotiations between buyers and sellers. A transaction fee would be charged to help fund the administration of the market.

The water right transfer process would be based on existing statutes, implemented in slightly different ways from Ecology’s current practices. Legislation would be needed to simplify the current analysis and make the process more transparent. To facilitate implementation and create an incentive, Ecology should also amend its rule to create a separate line for processing applications to transfer water rights that are being acquired through the market.

Option 1B: Open Water Market

This option provides the framework for a more open and active market. The transfer approval process would require legislative changes. The administrator of this market would operate not only as an information clearinghouse similar to Option 1A, but also as a broker to oversee the mechanics of the transaction. The administrator would offer technical support to move the transfer through the regulatory process. The administrator would also offer verification services to confirm that the seller no longer uses the right, the buyer received it, and both parties complied with the contract.

There are two options for administering and funding this market. One would be for a private, nonprofit organization to administer the market (like Option 1A), with operation of the market funded by transaction fees. A second option would be for a private, for-profit entity to administer the market and charge commissions as well as fees on transactions, including perhaps a use fee for water transferred through the market. The price for water would be market-driven, and anyone could buy or lease water through the market regardless of whether they currently have water rights.

The most significant difference from Option 1A would be the process for review and approval of the water right transfer. Under the Open Water Market Option, Washington State would adopt the "Colorado process" for use in the Yakima River basin. In Colorado, water courts are district courts, similar to Washington's superior courts. The water courts conduct general business of the district court but also specialize in water cases. An application to transfer a water right is submitted to the court, which assigns it to the water referee, who determines the validity of statements and consults with the relevant regional engineer. This would allow water rights transfers to be reviewed by a body that would be independent of Ecology and other regulatory agencies and have no responsibility for regulating the use of water rights.

Option 1C: Water Banking Using Existing Trust Water Rights Program

Under this option, the existing Trust Water Rights Program (TWRP) would function as the water bank. Under the TWRP, water rights can be temporarily or permanently transferred to trust. Those water rights that are temporarily transferred to trust may be withdrawn by the depositor for his or her own use or may be transferred to another person or entity. Those water rights permanently transferred to trust are either to be used according to the terms of the transfer or may be used by Ecology for any recognized beneficial use. Significantly, a water right is protected from relinquishment as long as it is in trust (RCW 90.38.040(6)). RCW 90.42.100 specifically authorizes Ecology to use the TWRP for water banking purposes in the Yakima River basin and has recently been amended to authorize the use statewide.

Ecology is authorized to acquire water rights, including storage rights, by purchase, lease, donation or other means, except condemnation, on a temporary or permanent basis (RCW 90.38.020(1)(a),(3)). When the TWRP is used as a bank, Ecology is the banker and can use the water itself or make it directly available to third parties.

The use of the TWRP has some potential constraints to success, in particular the requirements for approval of water right transfers can be complex and time consuming.

Alternative 1D: Nonregulatory Water Bank

Under this option, a bank would be formed outside of the TWRP. The bank could be administered by a private, nongovernmental entity (a nonprofit or for-profit organization) or by a nonregulatory governmental agency. The bank could offer a standing price for the purchase of water rights and for temporary deposits of water rights to be made available for lease, or the price could be negotiated on a case-by-case basis. The water right holder would be compensated regardless of whether the bank was able to sell or lease the rights and regardless of the price the bank received. Because the water rights would not be used while on deposit with the bank, legislative changes would be required to protect the rights from relinquishment.

The extent and validity of the right would be established prior to deposit to the bank. As with Option 1A: Status Quo Water Market, a water right confirmed in the adjudication within five years of deposit would be accepted as confirmed by the court. If more than five years had passed, the right could be certified by a Certified Water Rights Examiner.

The transfer of the water right would be reviewed at the time the water right is sold or leased from the bank. Because the extent and validity of the right would be established prior to deposit with the bank, the review of the transfer would be limited to the issue of impairment. The review could be conducted by Ecology as explained for Option 1A, or through a water court as recommended in Option 1B. Whichever approach is chosen, the goal would be to simplify the transfer process and create certainty and trust. As for the market alternatives, water right transfers from the bank to a third party would be processed through a separate line that would allow priority processing.

Option 1E: Drought Year Transfers Outside of Irrigation Districts

This option is intended to free up transfers of water outside of an irrigation district during drought years. Under current law, Ecology must receive the concurrence of an irrigation district where water is proposed to be transferred outside of the district (RCW 90.03.380(2)). Under this option, irrigation districts would be required to allow transfer up to 30 percent of the total water supply allotted to the district in years when the State declares a drought under RCW 43.83B.405. A system would be established to allow a member of the district to petition for the temporary transfer of water under their water right to Reclamation to be managed as part of TWSA. The member would fallow the acres associated with the transferred water. The member would be paid by Reclamation, Ecology or a water bank established for that purpose, who would in turn be paid by the recipient of the transferred water. Prices would be set by a process, yet to be determined, that may have Reclamation, Ecology or a water bank setting fixed prices or the different parties negotiating prices specific to individual transactions.

Option 1F: Irrigation District Bank

Under this option, an irrigation district would act as a water bank in all years, drought and nondrouoght. The difference from Option 1E is that the district would act as the bank rather than Reclamation or Ecology. A district would send out a call for water to their members at a fixed price. Water right holders within the district would decide to fallow all or a portion of their land for all or a portion of the irrigation season and bank their water with the district. The district could pool the banked water and identify blocks of water that they are willing to sell to junior districts or others. By selling large blocks the districts would have more pricing power. The districts would take a portion of the selling price and manage water use.

2.3.8.4 Recommended Options

Ecology anticipates current water marketing institutions and activity will continue in the short-term. However, the quantity of water that is currently marketed is small in comparison to the potential need and opportunity if new policies and programs were instituted. A description of recommended short term and long-term options follows.

Short-term Options

The short term options are a continuance of existing programs and policies such as Option 1C with additional steps taken to reduce impediments to transfer of water.

Ecology would need to take steps to change the cost and length of time required for review and approval of a water right transfer. Ecology would need to investigate the feasibility of expanding the continuing jurisdiction of the Yakima Superior Court, so it can expedite decisions on proposed water right transfers. This procedural alternative would rely on the process now used by the Yakima Superior Court to process temporary changes and transfers of water rights subject to the ongoing adjudication. It would be a much quicker process than the normal processing done by a conservancy board or Ecology. The Court could be expected to consider and rule on a transfer request in 90 days or less from the time a petition is filed with the Court. This compares to the 180 to 240 day minimum time to process an application for change through a conservancy board or Ecology, if staff resources are adequate.

Ecology would need to seek new legislation to extend the Court's jurisdiction to include permanent as well as temporary changes and transfers. The legislature would also have to approve continuing jurisdiction by the court to administer these changes and transfer after the final decree is signed in the Yakima Adjudication. The Court's jurisdiction is only for surface water and would need to be expanded if ground water was part of the water market. Finally, this approach would require funding for the Court to continue to review water right transfers after the adjudication is complete.

Ecology would also need to investigate a rule-based process for expedited transfers and water bank transactions. This would entail amending the "Hillis Rule," WAC 173-152-050, to designate water right transfers in the market or bank system as being eligible for priority processing. Expedited processing of water bank transactions could reduce the processing time, but would not reduce it to the 90 days or less that would be possible using the Court. Ecology anticipates that the Water Transfer Working Group would continue to review and make recommendations on water right transfers, which could reduce the overall processing time.

In addition, Ecology would need to explore the possibility of using temporary/seasonal transfers while a permanent transfer is being processed. This procedural alternative would provide a temporary approval of water right change or transfer applications that were not likely to result in impairment. If all participants including the Water Transfer Working Group agreed that the transfer met specific approval criteria, it could be given early approval without full consideration with little risk to applicants. The applicant could go forward with the change or transfer while a final decision was under consideration by a conservancy board or Ecology using the normal statutory review process.

Long-term Options

The long-term options are designed to open the water market to a much larger group of water users and change the administration of water markets. Option 1B would provide the framework for a more open and active market and would need to be pursued through legislation and establishment of water courts. The largest group of water users that could impact water markets is irrigation districts; therefore, long-term marketing options would primarily involve irrigation districts.

Irrigation districts have several characteristics that enable them to play a central role in water market activities, if they so desire. They manage much of the water withdrawn from the Yakima River and its tributaries, have important water management expertise, and have a significant financial stake in seeing that the basin's water resources are managed in a manner that will not jeopardize their infrastructure and other investments. They generally enjoy the trust of the farmers and landowners within their respective service territories, and, if they were to engage in water-market activities on behalf of their members, they potentially could do so with significant economies of scale and cost-savings relative to the costs individuals would incur acting independently.

Some irrigation districts in California and Colorado illustrate the roles that districts in the Yakima River basin might play (Ecology, 2009b). At the core of the arrangement, each district acts as an intermediary, paying farmers to fallow their lands temporarily and leasing to an outside entity, such as a municipal utility, the water that otherwise would be used to irrigate the lands. Such arrangements have several important characteristics that may diminish the influence of factors that have impeded the development of water-market activities in the basin:

- **Voluntary Participation by Landowners.** Landowners probably would participate only if they conclude that the expected benefits of the transaction exceed the expected costs.
- **Overcome Initial Inertia.** The district is familiar to and would act as the intermediary for all participating landowners, using standardized agreements. It may pay a signing-bonus to a landowner participating for the first time. These steps can reduce the costs and anxiety an individual landowner otherwise would experience if it had to deal with an unknown entity, such as a water utility.
- **Lower Measurement Costs.** Because the irrigation district knows how much water would have been used to irrigate each parcel, it can use acres-fallowed as the unit of measurement for determining how much water is made available by each participating landowner. Relative to making a separate determination of the quantity of water in acre-feet diverted and consumptively used for each transfer, this approach can reduce the costs of monitoring and verifying a landowner's compliance with contractual obligations.

- **System Operator Integrated into the Market.** The irrigation district that manages water and operates the water-delivery system would play a key role in each transaction. This arrangement probably would increase the likelihood that transactions would not jeopardize continued functioning of the system for the benefit of remaining irrigators.
- **Sustained Agricultural Activities.** Transactions involving short-term fallowing would not permanently remove land and water from agricultural production, thereby ameliorating concerns that they would lead to an unraveling of the basin's agricultural industry and culture. Short-term fallowing might allow for replenishment of nutrients and organic matter in the soil, improving fertility and productivity.
- **Shared and Managed Risk.** By dealing with the district as the intermediary that aggregates water from several landowners, rather than with the landowners individually, the buyer would face less risk that water promised would not be delivered, each participating landowner would face less risk that it would become isolated in legal wrangling with a vastly larger entity, and non-participating landowners would face less risk that the transfers would impair the performance of the irrigation system.

The success of the particular programs in California and Colorado depends in large part on the fact that the farmers in the irrigation districts grow annual crops and are able to fallow land on an annual basis. In the Yakima basin, much of the irrigated land is planted with perennial crops, such as orchards, vineyards and hops, or with alfalfa and Timothy hay. The 2007 agricultural census indicates that perennial crops were produced on about 98 percent of all irrigated croplands in Kittitas County (U.S. Department of Agriculture. 2009). Most of this involved the production of hay (and related) crops. Because the costs of replacing hay crops would be less than other perennial crops such as orchards or wine grapes, farmers might be more willing to transfer water from this land on a short-term basis. In Yakima County, the census found that about 25 percent of the irrigated land produced annual crops, and one-third of the land produced perennial crops involved the production of hay. In Benton County (all of it, not just the portion in the Yakima basin), more than 60 percent of the irrigated land produced annual crops, and one-quarter of the land that produced perennial crops produced hay.

These numbers do not directly measure the potential for farmers to voluntarily fallow their lands for a year and transfer the water to other uses or locations, because they do not account for the seniority of water rights, the location of individual parcels, and other factors likely to affect the willingness to fallow their lands. Much of the land in Kittitas County, for example, is irrigated under proratable water rights, so that water from these lands might have little practical value for transfer to others during periods of low water supplies. The numbers do, however, generally indicate the overall potential degree to which current cropping patterns might be conducive to annual-fallowing programs. Farmers producing annual crops likely would be most willing to participate, followed by farmers producing irrigated hay who would consider reducing the amount of irrigation and transferring the saved water to other uses or locations. If lands are temporarily taken out of perennial crop production or converted to non-agricultural land there may also be some opportunities for annual fallowing and water transfers.

For market transactions with an irrigation district as intermediary to materialize, the parties directly involved—the district, the participating landowners, and the buyer—must agree to the general concepts and the specific details. The parties also will have to address the concerns of potentially affected third parties, such as non-participating landowners served by the district, and the entities and individuals with an interest in how transactions might affect fish habitat. They also must reassure Reclamation that their transactions will not affect its ability to satisfy its operational obligations.

2.4 Alternatives Considered but not Carried Forward

Ecology worked with interest groups in the Yakima River basin to identify a broad range of projects to improve water supply. Some of the projects that were recommended were considered by Ecology, but are not being carried forward at this time for the reasons described below.

2.4.1 Black Rock Reservoir

Ecology, in conjunction with Reclamation, has thoroughly considered the Black Rock reservoir alternative. Reclamation concluded in its December 2008 Final Planning Report/EIS that the benefits of Black Rock, when compared to the impacts and costs, did not justify moving forward with any of the alternatives (see Section 1.5 of this document). Ecology agrees with that conclusion and has additional reasons for determining that Black Rock is not feasible in the near term. Black Rock does not solve some of the major aquatic resource problems in the Yakima basin, including fish passage and degraded habitat. The project lacks significant support from the end users of the water. Both the financial and the social opportunity cost of the Black Rock project are high and far outweigh the economic benefits that might accrue from Black Rock. There is also environmental uncertainty associated with the impacts of ground water seepage toward the Hanford site and the reliability of measures to control that seepage.

It is acknowledged that Black Rock reservoir would increase stream flows in the Yakima River year-round and those increases would benefit fish generally. Reclamation estimated that the project would increase anadromous fish stocks by 21-61 percent and steelhead stocks by 51 percent. The project does not include providing fish passage at any of the reservoirs in the basin or improvements to fish habitat anywhere in the basin. Ecology and fish managers in the basin believe that providing fish passage or habitat improvements would provide greater benefits to anadromous and resident fish than increased flows alone (see Sections 2.3.1 and 5.9 of this document).

The Yakama Nation and Roza Irrigation District submitted a joint comment letter in response to comments on the January 2008 Draft Planning Report/EIS by the Yakama Nation and Roza Irrigation District asserting that:

- Fish passage and habitat needs should be considered along with storage;

- Least-cost long-term solutions should be considered; and
- Solutions to water problems in the Yakima basin should be a package of measures that includes restoration of fish passage, additional conservation, water markets, and habitat restoration.

The Yakama Nation and Roza Irrigation District hold two of the largest proratable irrigation water rights in the basin and without their support, implementation of the Black Rock alternative would not be likely. The joint comment letter is included as Comment Letter TRB-0002 in Chapter 6 of this document. In response to these and similar stakeholder comments, Ecology initiated the Supplemental Draft EIS and the development of the Integrated Water Resource Management Alternative.

Reclamation described the high financial costs associated with constructing and operating Black Rock in the December 2008 Final Planning Report/EIS. The most probable construction costs of Black Rock would be $5.69 billion. The annual operations and maintenance cost would be $60 million. By comparison, the current annual operation and maintenance costs for Reclamation's Yakima Project are $6 to $7 million. These costs far exceed the projected average annual benefit of $52.5 million.

In addition to the financial costs of construction and operation, there are significant opportunity costs associated with Black Rock reservoir. Social opportunity cost refers to the opportunities forgone by society; whereby choosing one alternative would preclude the possibility to implement others. In the case of Black Rock, the social opportunity costs would include the projects that could not be developed if funds and other resources are allocated to the reservoir. The high cost of constructing and operating Black Rock reservoir would reduce the amount of funding available to address other water needs in eastern Washington. Climate change and water shortages will affect all of eastern Washington. The adaptive management program that will be needed to address these problems must be comprehensive in scope and must address the needs of all watersheds. Black Rock would address only some of the problems in a limited geographic area and would significantly deplete the amount of funding available to spend in other basins. Since Black Rock could only be built with a multi-billion dollar public subsidy, that taxpayer money would not be available to spend for other important public purposes.

Reclamation identified ground water seepage from the reservoir toward the Hanford Nuclear Reservation as a potential significant environmental impact. Ground water from the reservoir could seep toward the Hanford site and complicate cleanup of the radioactive and chemical contaminate and possibly increase the potential for the contamination to reach the Columbia River. Reclamation concluded that the seepage could be intercepted before it reaches the western boundary of the Hanford Site. Reclamation's model results suggest the proposed mitigation measures would eliminate nearly all impacts to groundwater at the Hanford Site. Ecology believes that there is still a great deal of uncertainty around the Hanford seepage issue. Both the Environmental Protection Agency and the U.S. Department of Energy have indicated opposition to construction of Black Rock because of the potential risk. The Department of Energy is expected to soon release its Tank Closure EIS and it is expected that the EIS will reach a different conclusion than that released by Reclamation regarding the efficacy of mitigation measures to prevent negative impacts at the Hanford site. Ecology believes that even if risks associated with seepage toward Hanford are small, the results could be catastrophic. Therefore, Ecology believes there must be more certainty that seepage could be intercepted before the Black Rock project would not pose a significant environmental impact.

2.4.2 Other Storage Projects

A number of other reservoir sites have been suggested and reviewed by Reclamation, but were not carried forward to a feasibility level study for further analysis. A listing of those projects is provided in Table 2-5, along with Reclamation's reasons for not further studying each project (Reclamation, 1984). Although these storage projects were determined to not be feasible at the time they were evaluated, they may become more feasible in the future if they are evaluated under new criteria and circumstances.

Table 2-5 Potential Storage Sites Considered

Name	Stream	Location	Maximum Capacity (acre-feet)	Reason for Not Carrying Forward
Bakeoven	Tieton River, South Fork	1.5 miles NE of Grey Creek Campground	35,000	Cost
Casland	Teanaway River, North Fork	3 miles north of Casland	63,000	Cost
Cle Elum Lake Enlargement	Cle Elum River	Existing Cle Elum Dam	485,000 (50,000 new)	Not listed
Cooper Lake	Cooper River	Cooper Lake outlet		Cost, wilderness impacts
Cowiche	Cowiche Creek, South Fork	6 miles west of Cowiche	16,000	Cost
Dog Lake	Clear Creek	Dog Lake outlet		Cost, limited water supply
East Selah	Yakima River	Gravel pits at Selah	3,000	Cost
Forks	Teanaway River	1 mile downstream of North and West Forks junction	390,000	Cost, geology
Hole in the Wall	Dry Creek	2 miles NW Hwy 97 crossing	25,000	Cost
Horseshoe Bend	Naches River	3 miles upstream of Tieton River	80,000	Cost, geology, block anadromous fish
Hyas Lake	Cle Elum River	Hyas Lake outlet	Not listed	Cost, limited water supply, wilderness impacts
Little Rattler	Rattlesnake Creek	1 mile upstream Naches River	112,000	Cost, inundates big game winter range and high-quality resident fishery
Lost Meadow	Little Naches River	1 mile NW Naches Pass Forest Camp	30,000	Cost

Name	Stream	Location	Maximum Capacity (acre-feet)	Reason for Not Carrying Forward
Lower Canyon	Yakima River	Mouth of Yakima Canyon	350,000	Railroad relocation cost, block anadromous fish, other adverse impacts
Manastash	Manastash Creek	7 miles west of Ellensburg	50,000	Cost
Mile Four	Rattlesnake Creek	4 miles upstream from Nile	45,000	Inundates big game winter habitat and resident fishery
Minnie Meadows	Tieton River, South Fork	1 mile SW of Grey Creek Campgrounds	35,000	Cost
Naneum	Naneum Creek	10 miles north of Ellensburg	40,000	Cost
Pleasant Valley	American River	Near Thunder Creek Campground	150,000	Block anadromous fish, impact recreation
Rattlesnake	Naches River	Immediately below Rattlesnake Creek	85,000	Block anadromous fish, social effects problem
Rimrock Lake Enlargement	Tieton River	Existing Tieton Dam	270,000 (172,000 new)	Engineering concerns
Satus	Satus Creek	8 miles west of Satus	175,000	Yakama Nation site
Simcoe	Simcoe Creek – Toppenish Creek (require other sources to fill)	4 miles west of White Swan	95,000	Yakama Nation site
Soda Springs	Bumping River	At Soda Springs Campground	360,000	Alternative to Bumping Lake enlargement, higher costs, adverse impacts
Swauk	Swauk Creek	0.5 miles upstream from Yakima River	75,000	Wildlife impacts
Tampico	Ahtanum Creek	7 miles west of Wiley City	72,000	Yakama Nation site
Toppenish	Toppenish Creek	9 miles SW of White Swan	125,000	Cost
Upper Canyon	Yakima River	0.5 miles upstream from Swauk Creek	190,000	Major barrier to anadromous fish
Wapatox	Naches River	0.5 miles below Tieton River	100,000	Block anadromous fish
Waptus Lake	Waptus River	Waptus Lake outlet	Not listed	Cost, wilderness impacts

2.4.3 Operational Changes at Existing Reservoirs

Ecology received several suggestions that the "flip-flop" regime should be altered to benefit fish. Ecology considered this option, but determined that on its own, the regime cannot be changed because of Reclamation's obligations to provide irrigation water and meet fish target flows. However, it may be possible to modify the "flip-flop" regime in conjunction with storage projects to reduce the adverse impacts associated with the practice. This option is considered in Sections 2.3.4.

2.4.4 Direct Pumping from the Columbia River

Suggestions have been made to pump water directly from the Columbia River to supply water for irrigation or to improve stream flows. Two of the suggestions were to pump water directly from the Columbia River to supply the proposed Wymer reservoir and to pump water directly into the Roza Irrigation District canal to supply water for proratable users. Ecology believes that uncertainty about water availability in July and August and the cost of pumping cast significant doubts about the feasibility of such a proposal.

July and August are critical periods for irrigation in the Yakima River basin and also for fish flows in the Columbia River. The 2008 Biological Opinion for the Federal Columbia River Power System (FCRPS) includes salmon flow objectives during July and August. The flow objectives could limit diversions from the Columbia during those months, especially during dry years when supplemental irrigation water would be most needed in the Yakima basin.

Pumping water from the Columbia River into the Yakima basin is costly because the Columbia River is much lower in elevation than the Yakima basin. Priest Rapids Dam on the Columbia River is at a lower elevation than the Yakima basin. Pumping from the Columbia would require pumping over or tunneling beneath Umtanum and Yakima Ridges with elevations over 3,000 feet. Reclamation estimated the cost for pumping water from the Columbia River to fill Black Rock reservoir at approximately $50 million per year.

An alternative of pumping directly from the Columbia River to Roza canal without using a reservoir has not been fully considered, but seems infeasible at this time. Because of these considerations, Ecology has decided not to carry forward the direct pumping option at this time. However, a more modest direct pumping proposal involving a smaller pump station and lower capacity conveyance may warrant further investigation.

CHAPTER 3.0 AFFECTED ENVIRONMENT

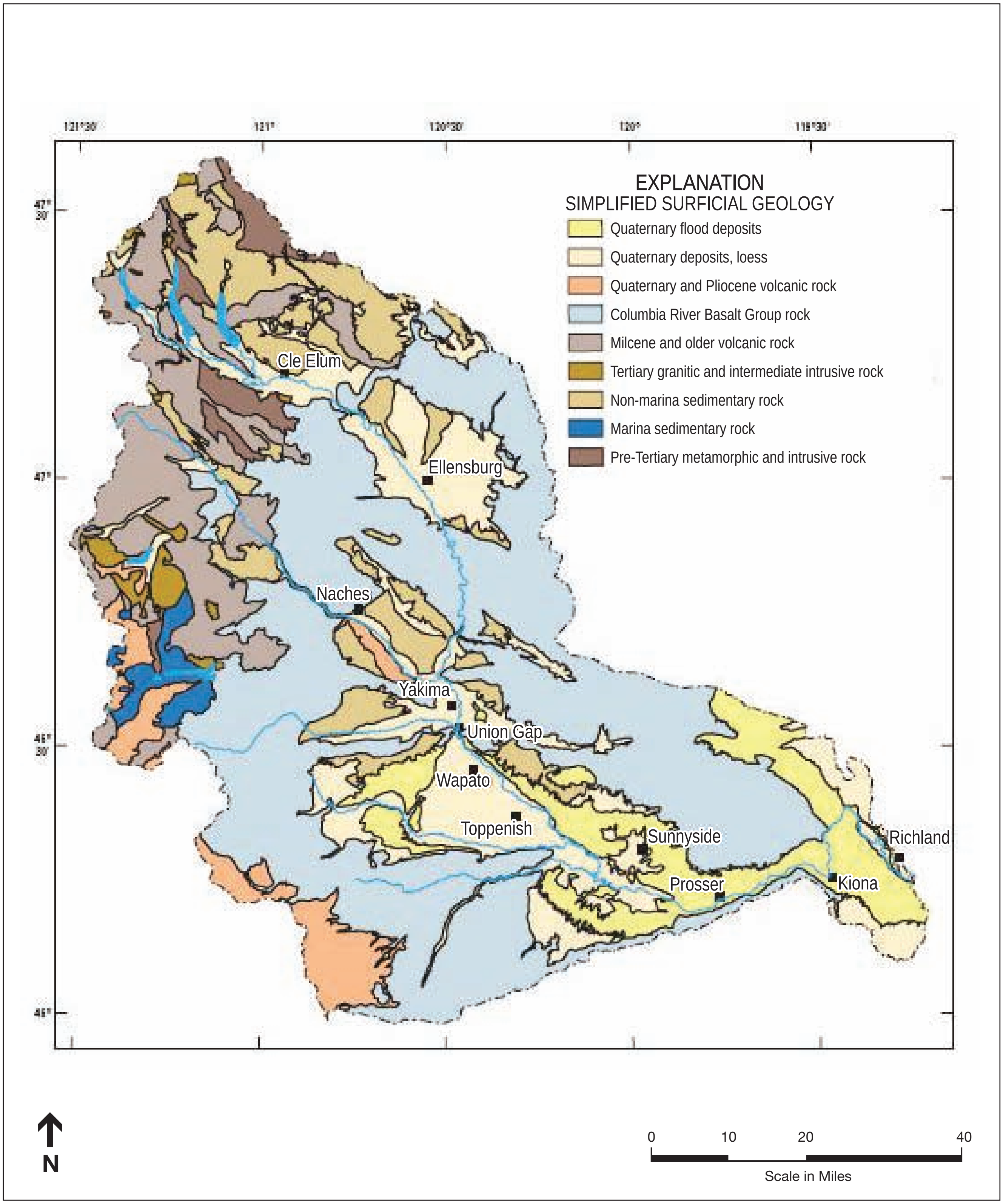
The affected environment for this Supplemental Draft EIS is the Yakima River basin in eastern Washington (Figure 1-1). The affected environment includes areas along the mainstem Yakima River and its tributaries, including the five major storage reservoirs in the upper basin. The January 2008 Draft Planning Report/EIS described most of the basin in Chapters 4 and 5. This chapter includes additional information needed to help clarify potential impacts or to describe areas that were not included in the January 2008 Draft Planning Report/EIS. Generally the areas not included in the January 2008 Draft Planning Report/EIS are the five major reservoirs in the Yakima River basin—Cle Elum, Kachess, Keechelus, Bumping, and Tieton (Rimrock)—and the tributaries to the mainstem Yakima River. The Integrated Water Resources Management Alternative includes projects in those areas.

3.1 Earth

The earth environment was described in Sections 4.5 and 5.5 of the January 2008 Draft Planning Report/EIS. This section summarizes the geologic and geomorphic setting for the Yakima River basin. The focus of the discussion is the potential for erosion and sedimentation.

The Yakima River basin encompasses approximately 6,150 square miles (EES, 2003). Figures 3-1 and 3-2 show the simplified geologic and structural features of the basin (USGS, 2006). The headwaters of the basin start in the Middle Cascades in the Cascade Mountain Range and generally flow southeast to join the Columbia River. The basin ranges in elevation from 12,000 feet in the Cascades to 350 feet at the Columbia River confluence. The western half of the basin is located in the Middle Cascades and the eastern half is located within the Columbia Plateau basalt (Kinnison and Sceva, 1963). The Middle Cascades include igneous, sedimentary, and metamorphic rocks of many ages. The Columbia Plateau is primarily made of Tertiary-age basalt flows, called the Yakima Fold Belt. These flows have created a series of southeast-trending ridges and valleys (Reclamation, 1979). The Yakima River incised canyons and water gaps through the ridges and deposited gravels eroded from uplifting mountains and ridges in the valleys. The average suspended sediment yield is on the order of 50 tons per square mile in the Yakima River basin (Reclamation, 1979).

The geology and ground water of the Yakima basin have been extensively documented by the U.S. Geological Survey (USGS) (2006) in a study undertaken as part of an agreement between Ecology, Reclamation, and the Yakama Nation. In its study, USGS divides the Yakima River basin into ground water basins separated from one another by anticlinal or monoclinal ridges. This section describes the geology of the Yakima basin in the context of those drainage basins.



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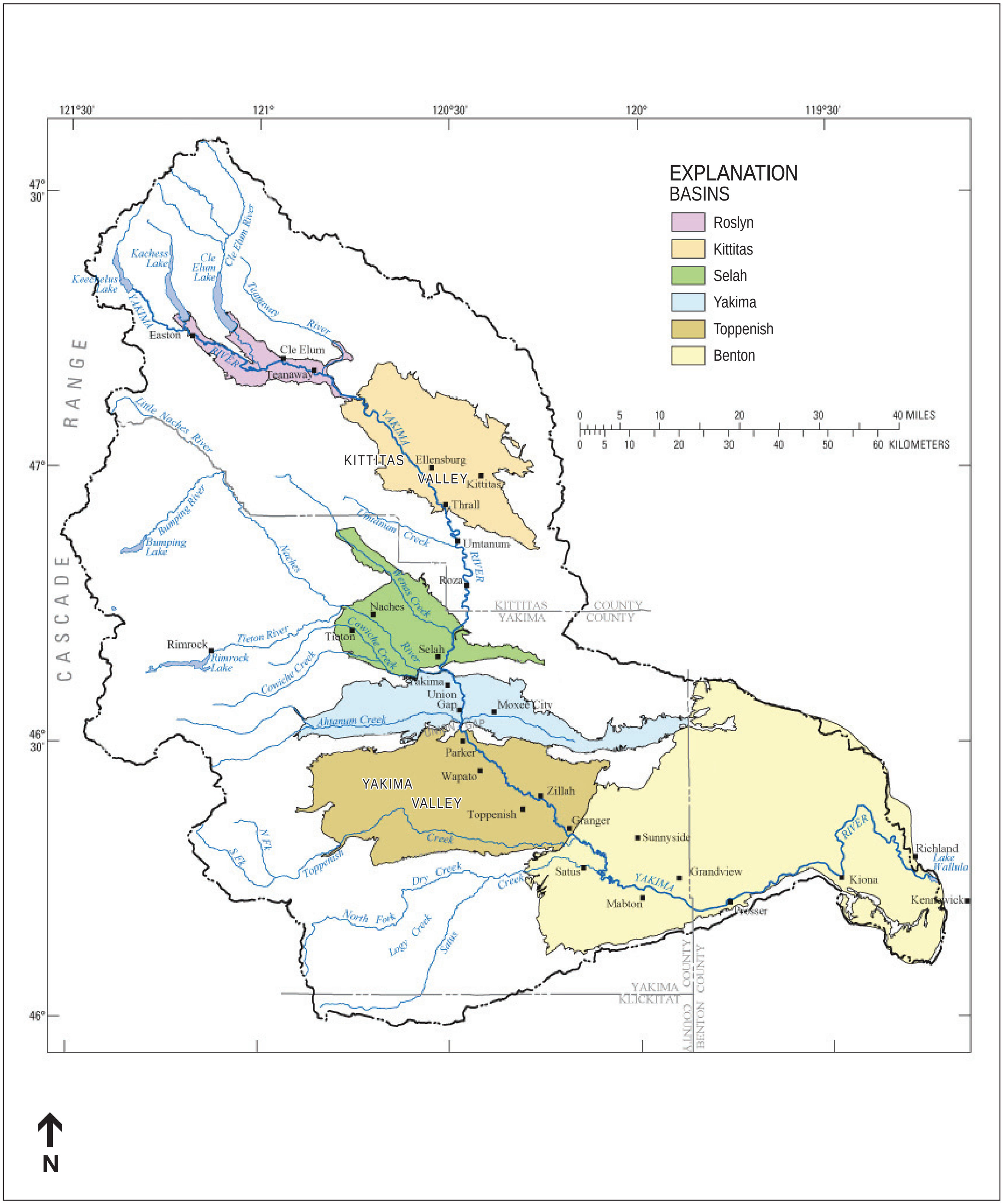
SOURCE: USGS, 2006.

Figure 3-1
Simplified Surficial Geology of the Yakima River Basin
Washington



SOURCE: USGS, 2009.

Yakima River Basin Integrated Water Resource Management Alternative . 207369

Figure 3-2
Ground Water Basins in the Yakima River Basin
Washington

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3.1.1 Roslyn Basin

The Roslyn basin includes the Cle Elum River and reservoir, Kachess and Keechelus reservoirs, the Teanaway River, and Swauk Creek. It is located in the northwest portion of the Yakima River basin, in an area dominated by Mesozoic metamorphics and Tertiary volcanic deposits. In the valley floor, basin-fill deposits consist predominantly of alluvial, lacustrine, and glacial deposits.

3.1.1.1 Cle Elum Dam

Lake Cle Elum and Cle Elum Dam are located in a U-shaped valley formed by multiple glaciers during the Pleistocene period. A moraine deposited by the last glacial advance blocked the valley and formed a natural dam, impounding the lake. The moraine was subsequently breached, and a deep channel was incised through the moraine and outwash deposits, forming the outlet of the glacial lake. In 1933, Reclamation completed an earth- and gravel-fill dam, Cle Elum Dam, which blocks the deep channel that had worn through the moraine materials (Kinnison and Sceva, 1963). The impounded Cle Elum Lake has a surface elevation close to the original glacial lake (Reclamation, 2008b).

The glacial materials near the dam range in size from rock flour to boulders. The bedrock has not been reached during investigations at the dam. Bedrock is expected to be composed of volcanic and sedimentary units (Reclamation, 2008b).

The North Fork of the Cle Elum River drains approximately 37.9 square miles. In the vicinity of the USGS gage at Galena (12 miles north of Cle Elum Lake), the river has eroded a deep valley into the Swauk formation. The valley is narrow with alluvial materials of unknown thickness on the valley floor (Kinnison and Sceva, 1963). At the USGS gage 1,000 feet downstream of Cle Elum Dam, the river flows through older fill deposits composed of sand, medium to coarse gravels, and boulders. These materials are several hundred feet thick (Kinnison and Sceva, 1963).

3.1.1.2 Keechelus and Kachess Dams

Keechelus Lake was originally created by a moraine impoundment following the last glaciations (Kinnison and Sceva, 1963). Construction of Keechelus Dam, an earth- and gravel-fill dam, was completed by Reclamation in 1920 (Kinnison and Sceva, 1963). The dam provides 157,900 acre-feet of active storage over the natural lake. The surface geology near Keechelus Dam is primarily composed of glacial materials. Lacustrine deposits and peat soils have been found adjacent to the lake (WSDOT and FHA, 2005). The dam was built on Quaternary-age glacial drift and outwash sediments. The glacial drift has a low permeability, and seepages observed downstream are assumed to pass through the outwash sediments (Reclamation, 2008e).

Lake Kachess was also originally impounded by a glacial till moraine. The till includes a heterogeneous mix of clays, silts, sands, gravels, cobbles, and boulders. The moraine ranges in depth from 45 to 100 feet and may be up to 200 feet deep beneath the dam (Reclamation, 2008d). Bedrock in the area includes basalts, metamorphic rocks, and other formations believed to have low permeability and porosity (Kinnison and Sceva, 1963). In 1912, construction of the earth- and gravel-fill Kachess Dam was completed (Kinnison and Sceva, 1963).

3.1.2 Kittitas Basin

The Kittitas basin includes the Teanaway River, Taneum, Wilson, Naneum, Swauk, and Manastash Creeks (Figure 1-1). It is located in the north-northeast part of the Yakima basin, an area of basalt terrain in the uplands and alluvial fill deposits in the lower segments of the basin. The northeastern part of the basin contains several east-west and northwest-trending high-angle faults. The southwestern part of the basin contains northwest-trending strike-slip and thrust faults.

The Teanaway River drains 200 square miles. The river flows through the southern edge of the valley in Quaternary fill containing sand and coarse gravel alluvium. The southern valley slope is formed of Columbia River Basalt. The valley floor is underlain by a sand and gravel alluvium (Kinnison and Sceva, 1963).

Swauk Creek drains 87.8 square miles. Taneum Creek, located northwest of Thorp, drains 76.3 square miles. Both creeks flow through canyons composed of Columbia River Basalt. The canyon floors are filled with a coarse gravel alluvium of unknown depth (Kinnison and Sceva, 1963).

3.1.3 Selah Basin

The Selah basin, located in the central part of the Yakima River basin, extends to the Cascade Crest and headwaters of the Naches and Bumping Rivers (Figure 1-1). The basin includes the Bumping and Tieton Rivers and Cowiche Creek. The western portion of the basin contains Miocene volcanic rocks and Tertiary intrusives, while the middle portion contains the western margins of the Columbia River Basalt Group. The lower portion of the basin contains alluvial basin fills, bounded by the Manastash and Umtanum Anticlines and the Yakima Ridge structure. Parts of the basin are dissected by northwest-southeast trending folds.

3.1.3.1 Bumping Lake Dam

The construction of Bumping Lake Dam was completed in 1910, raising the elevation of an existing natural lake (Kinnison and Sceva, 1963). The dam is an earth-fill dam located in a deep, steep-walled canyon, formed in part by glacial activity. The canyon is formed of volcanic flow rocks and the valley is covered by glacial till and outwash overlain by lahar materials. Outwash materials include silts, sand, gravels, cobbles, and boulders (Reclamation, 1979). Lahar materials contain silty sand with gravels and cobbles. The material includes organic debris and is interblended with volcanic ash (Reclamation, 2008a). The river drains 68.6 square miles and flows through a valley underlain with an unconsolidated sand and gravel fill of unknown thickness (Kinnison and Sceva, 1963).

3.1.3.2 Tieton Dam

Tieton Dam is an earth- and gravel-fill dam set in a basin of basalt flows overlaying shale and sandstone sediments. The dam was completed in 1925 (Kinnison and Sceva, 1963). Volcanic flows partially filled sections of the canyons with andesite. The canyons were cut by stream erosion and partially filled with Quaternary-age fills (Kinnison and Sceva, 1963). Glacial materials are present on the valley floor and occasionally on the valley walls (Reclamation, 2008f).

3.1.4 Ahtanum-Moxee Basin

The Ahtanum-Moxee basin is a long, narrow, east-west trending basin in the central part of the Yakima River basin (Figure 1-1). The western portion of the basin contains Miocene volcanic rocks and Tertiary instrusives, while the middle and eastern portions contain alluvial basin fill, including the Ellensburg Formation. The basin is bisected by the Ahtanum-Moxee Syncline.

3.1.5 Toppenish Basin

The Toppenish basin is in the south-central part of the Yakima River basin. It is underlain by Columbia River Basalt in the upland areas and alluvial basin fills in the lowland areas(Figure 1-1). The basin is bisected by the Wapato Syncline.

3.2 Climate Change

A summary of studies on climate change and potential impacts on water supply was presented in Section 4.2.2.6 of the January 2008 Draft Planning Report/EIS. The studies indicate that temperatures in the Pacific Northwest have increased over historic records and that spring snowpack has declined (Mote et al., 2003; Rauscher et al., 2008; Purdue University, 2008). There is consensus in recent studies that climate change has the potential to significantly alter the temperature, amount and timing of runoff, fish and wildlife habitat and the agricultural economy in the Yakima River basin.

Ecology and the Washington Department of Community, Trade, and Economic Development (CTED) recently worked with the University of Washington's Climate Impacts Group to assess impacts of climate change in Washington. The studies were authorized through the 2007 House Bill (HB) 1303 and Executive Order 07-02. The Climate Impacts Group released its assessment of the changes associated with global warming, including impacts to public health, agriculture, forestry, infrastructure, and water supply and management, in early 2009. Key temperature and precipitation findings for the Yakima River basin included:

- An increase in average annual temperature of 2.0° C (1.5-5.2° F) by the 2040s and an increase in water temperatures.
- A 38-46 percent decline in spring snowpack by the 2040s. Streams and rivers would experience higher extreme stream flows: more frequent periods of high flow in the winter and more frequent periods of low flow in the summer. Flooding that

historically has occurred in some parts of the Yakima River basin every 20 years, on average, is expected to occur up to 50 percent more frequently by 2040.

The Climate Impacts Group study is based on scenarios (including middle of the road scenario A1B) developed by the Intergovernmental Panel on Climate Change. Many scientists now recognize that emissions are rising faster than these scenarios anticipate and that temperatures and precipitation patterns will likely change more dramatically. Effects of climate change on agriculture, water supply and fish habitat in the Yakima River basin are summarized below.

- Summer reservoir storage would decline and winter storage would increase. For example, Bumping Lake currently has a 7 percent probability of dropping below 10 percent of its capacity; in 2040, that probability would rise to 26-34 percent. The Keechelus reservoir currently has a 53 percent probability of falling below 10 percent of its capacity, and this probability would increase to 81-88 percent by 2040.
- Climate change would have a minimal effect on senior water rights, but would likely have a significant effect on junior water rights. The probability that junior water rights would be prorated would increase from 30 percent, as it is currently, to 65-74 percent by 2040. And, water deliveries would drop below 50 percent an estimated 18-24 percent of the time in 2040, where this currently occurs 10 percent of the time.
- Changes in water availability and carbon dioxide levels due to climate change would affect agricultural production, including a decline in cherry and apple crop values and yields. There would be an estimated loss of $25 million in total annual apple and cherry crop value by 2040. Stockle et al. (2008) and the Climate Impacts Group also looked more broadly at the potential effects on agriculture in greater eastern Washington and found that there would be a range of positive and negative effects on agriculture and that the effects would depend on measures taken to adapt. Niemi et al. (2009) and the University of Oregon predicted that the potential reduction in agricultural output in the Yakima River basin – without adaptation measures – would amount to $46 million by 2040.
- Higher temperatures are expected to interfere with salmon migration, elevate the risk of disease, and increase mortality for both adult and juvenile fish. Increases in the frequency and intensity of winter flooding are expected to have a negative effect on the survival of juvenile coho, Chinook, sockeye, and steelhead. Reductions in spring snowmelt and flows during the summer and fall may have a negative effect on the migrations of salmon populations, including summer-run steelhead, sockeye, and summer Chinook. Extreme thermal stress and thermal barriers to migration are expected to persist for 10–12 weeks, from mid-June to early September, in the Upper Yakima River. Low flows may also negatively affect the supply of suitable rearing habitat for Chinook, coho, and steelhead, and the supply of spawning habitat for salmon populations that spawn in early fall.

3.3 Surface Water

This section provides additional information on water bodies that could be affected by the proposal. These water bodies are illustrated in Figure 1-1. In the Yakima River basin these include five reservoirs, three Yakima River tributaries located above the reservoirs, and 10 smaller tributaries. In the Naches River basin they include portions of the Bumping River, Naches River, Tieton River, and Cowiche Creek. The Columbia River near its confluence with the Yakima River could also be affected and is discussed below.

3.3.1 Yakima River Basin Reservoirs

Five major reservoirs make up the storage component of the Yakima Project. These reservoirs are Keechelus, Kachess, Cle Elum, Bumping, and Rimrock (Tieton). A small reservoir, Clear Lake, also exists on the Tieton River above Rimrock Lake. These surface water bodies are controlled by system operations and may be affected by the proposed alternative. A description of the operations of the Yakima Project and the reservoirs is provided in Section 2.3.2 of the January 2008 Draft Planning Report/EIS and will not be further discussed.

A summary of the system storage capacity, average annual runoff, and historical storage on September 30 for the Yakima Project is presented in Table 3-1.

Table 3-1 Yakima Project System Storage Summary (Period of Record: 1920-1999)

Reservoir	Reservoir Drainage Area (square miles)	Depth (feet)	Active Storage Capacity (acre-feet)	Average Annual Runoff (acre-feet)	Ratio of Runoff to Capacity	Sept 30 Minimum Historical Storage (acre-feet)	Sept 30 Average Historical Storage (acre-feet)	Sept 30 Maximum Historical Storage (acre-feet)
Keechelus	54.7	Maximum - 310 Mean - 96	157,800	244,764	1.5:1	4,800	40,500	126,900
Kachess	63.6	Maximum - 430	239,000	213,398	0.9:1	20,100	107,200	227,200
Cle Elum	203.0	Maximum - 258 Mean - 109	436,900	672,200	1.5:1	12,900	118,000	359,500
Bumping	70.7	Maximum - 117 Mean - 45	33,700	209,492	6.2:1	2,400	7,900	24,600
Rimrock	187.0	174[a]	198,000	367,966	1.8:1	200	74,500	145,100
System	**579.0**		**1,065,400**	**1,707,820**	**1.6:1**	**51,700**	**357,500**	**660,200**

Source: Reclamation, 2002.

[a] FERC (1990) did not specify whether this is a maximum or mean depth.

Reclamation operates Hydromet, a series of stream and reservoir level gages for Reclamation projects, including the Yakima Project. Data on reservoir levels and discharge from the reservoirs are available at http://www.usbr.gov/pn/hydromet/ and will not be summarized in this document.

3.3.1.1 Keechelus Lake

Keechelus Lake is located 10 miles northwest of the town of Easton and is the furthest upstream on the Yakima River system at River Mile (RM) 214.5 on the Yakima River. Keechelus Lake was constructed over a natural lake and is impounded by Keechelus Dam. Keechelus Dam is an earth-fill dam 128 feet high and 6,650 feet wide at the crest (Reclamation, no date). Keechelus Lake has an active capacity of 157,800 acre-feet at an elevation of 2,525 feet (Reclamation, 2002).

3.3.1.2 Kachess Lake

Kachess Lake is located about 2 miles northwest of Easton in the upper Yakima River basin. It releases water into the Kachess River, which flows into the Yakima River at RM 203.5. Kachess Lake was constructed over a natural lake and is impounded by Kachess Dam. Kachess Dam is an earth-fill dam 115 feet high and 1,400 feet wide at the crest (Reclamation, no date). Kachess Lake has an active capacity of 239,000 acre-feet at an elevation of 2,268 feet (Reclamation, 2002).

3.3.1.3 Cle Elum Lake

Cle Elum Lake is located 8 miles northwest of the town of Cle Elum in the upper Yakima River basin. It releases water into the Cle Elum River, which flows into the Yakima River at RM 185.6. Cle Elum Lake was constructed over a natural lake and is impounded by Cle Elum Dam. Cle Elum Dam is an earth-fill dam 165 feet high and 1,801 feet wide at the crest (Reclamation, no date). Cle Elum Lake has an active capacity of 436,900 acre-feet at an elevation of 2,250 feet (Reclamation, 2002).

3.3.1.4 Bumping Lake

Bumping Lake is located on the Bumping River in the Naches River basin about 29 miles northwest of the town of Naches. The Bumping River flows into the Naches River at RM 44.6. Bumping Lake was constructed over a natural lake and is impounded by Bumping Dam. Bumping Dam is an earth-fill dam 60 feet high and 2,925 feet wide at the crest (Reclamation, no date). Bumping Lake has an active capacity of 33,700 acre-feet at an elevation of 3,435 feet (Reclamation, 2002).

3.3.1.5 Rimrock Lake

Rimrock Lake is located on the Tieton River in the Naches River basin about 40 miles northwest of the City of Yakima. The Tieton River flows into the Naches River at RM 17.5. Rimrock Lake is impounded by Tieton Dam. Tieton Dam is an earth-fill dam constructed with a concrete core 319 feet high and 920 feet wide at the crest (Reclamation, no date).

Rimrock Lake has an active capacity of 198,000 acre-feet at an elevation of 2,935 feet (Reclamation, 2002).

3.3.2 Yakima River

Reaches along the Yakima River and its main tributaries that are affected by the operation of the Yakima Project and which may be affected by the alternatives are listed in Table 3-2. Figures 2-1, 2-2, and 2-3 show the location of the tributaries. Those Yakima River reaches were discussed in detail in the January 2008 Draft Planning Report/EIS (Section 4.2) and will not be further described in this chapter.

The reaches not described in the January 2008 Draft Planning Report/EIS are those located above the Yakima Project reservoirs, including Cle Elum River above Cle Elum Lake, Kachess River above Kachess Lake, and Gold Creek above Keechelus Lake. These waterways are described below. Additional information on the condition of the tributaries is provided in Section 3.9.

Table 3-2 Yakima River Reaches

Reach Name*	Yakima River Mile Location	Length (miles)
Upper Yakima River	**214.5 to 127.9**	**86.6**
Yakima River from Keechelus Dam to Easton	214.5 to 202.5	12.0
Kachess River from Kachess Dam to Yakima River	*203.5*	*0.9*
Yakima River from Easton to Cle Elum River	202.5 to 185.6	16.9
Cle Elum River from Cle Elum Dam to Yakima River	*185.6*	8.2
Yakima River from Cle Elum River to Roza Dam	185.6 to 127.9	57.7
Middle Yakima River	**127.9 to 47.1**	**80.8**
Yakima River from Roza Dam to Naches River	127.9 to 116.3	11.6
Naches River (details in Table 3-3)	*116.3*	*44.6*
Yakima River from Naches River to Roza Power Plant Return	116.3 to 113.3	3.0
Yakima River from Roza Power Plant Return to Wapato Diversion Dam	113.3 to 106.7	6.6
Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	106.7 to 103.8	2.9
Yakima River from Sunnyside Diversion Dam to Marion Drain	103.8 to 82.8	21.0
Yakima River from Marion Drain to Prosser Dam	82.8 to 47.1	35.7
Lower Yakima River	**47.1 to 0.0**	**47.1**
Yakima River from Prosser Dam to Chandler Canal Return	47.1 to 35.8	11.3
Yakima River from Chandler Canal Return to Columbia River	35.8 to 0.0	35.8

* Italicized entries are tributaries of the Yakima River

3.3.2.1 Cle Elum River above Cle Elum Lake

The Cle Elum River watershed has over 500 miles of streams and drains 231 square miles, with a vast majority occurring above Cle Elum Lake. Stream flow in the Cle Elum River above Cle Elum Lake is unregulated (Haring, 2001). Cle Elum Dam is a current barrier to fish passage; however, if structures were installed at Cle Elum Dam to allow for fish passage above Cle Elum Lake, up to 29.4 miles of suitable habitat for anadromous salmonids of the Cle Elum River and its tributaries above Cle Elum Lake would become available (see Section 2.3.2) (Reclamation, 2005a).

3.3.2.2 Kachess River above Kachess Lake

The Kachess River has a drainage area of 81 square miles of forested land. Stream flow above Kachess Lake is unregulated. Box Canyon Creek is one of the tributaries to the Kachess River. High stream flows occur through the winter, spring, and early summer, and low stream flows occur through late summer and fall (Haring, 2001). Kachess Dam is a current barrier to fish passage; however, if structures were installed at Kachess Dam to allow for fish passage above Kachess Lake, approximately 2.4 miles of suitable habitat for anadromous salmonids of the Kachess River and its tributaries above Kachess Lake would become available (see Section 2.3.2) (Reclamation, 2005a).

3.3.2.3 Gold Creek above Keechelus Reservoir

Gold Creek flows into Keechelus Lake at the head of the Yakima River. Flows in Gold Creek have been affected by low rainfall, Gold Creek Pond, timber harvest, and road and residential developments (Haring, 2001). Keechelus Dam is a current barrier to fish passage; however, if structures were installed in Keechelus Dam to allow for fish passage, approximately 13 miles of suitable habitat for anadromous salmonids, including 7 miles of Gold Creek, would become available (see Section 2.3.2) (Reclamation, 2005a).

3.3.3 Naches River Basin

Major reaches within the Naches River basin that are affected by the Integrated Water Resource Management Alternative are listed in Table 3-3. These reaches are shown in Figure 2-3. Streamflow data for these reaches are available from Reclamation's Hydromet system at http://www.usbr.gov/pn/hydromet/ and will not be summarized in this document.

Table 3-3 Naches River Reaches

Reach Name	Naches River Mile Location	Length (miles)
Bumping River from Bumping Dam to Little Naches River	44.6	16.6
Upper Naches River from Bumping River to Tieton River	44.6 to 17.5	27.1
Tieton River from Tieton Dam to Naches River	17.5	21.3
Lower Naches River from Tieton River to Yakima River	17.5 to 0.0	17.5

The other river reaches and tributaries that may be affected by the Water Resource Management Alternative are Cowiche Creek, the Bumping River above Bumping Lake, and the Tieton River above Rimrock Lake. A description of the river reaches and tributaries affected is provided in the following sections.

3.3.3.1 Bumping River Reach

The Bumping River reach is located on the Bumping River beginning downstream of Bumping Dam and ending at the Little Naches River. Its stream flow is controlled by the operations of Bumping Lake, one of the five major storage facilities within the Yakima Project. The operations of the Yakima Project are described in Section 2.3.2 of the January 2008 Draft Planning Report/EIS. Bumping River contributes approximately 6 percent of the total annual runoff of the Yakima River (Reclamation, 1979).

3.3.3.2 Bumping River above Bumping Lake

Bumping Dam is a current barrier to fish passage. If structures were installed in Bumping Dam to allow for fish passage above Bumping Lake, one mile of Bumping River has suitable habitat for anadromous fish. In addition, five miles of Deep Creek, a tributary to Bumping River, has suitable habitat for anadromous fish that would become available (Reclamation, 2005a).

3.3.3.3 Upper Naches River Reach

The upper Naches River reach is located on the Naches River beginning downstream of the confluence with the Bumping River and ending at the confluence with the Tieton River. Stream flow within the upper Naches River reach is affected by Bumping Lake operations because Bumping River flows into the upper Naches River reach (Reclamation, 2006).

3.3.3.4 Tieton River Reach

The Tieton River reach begins below Tieton Dam and ends at its confluence with the Naches River. The Tieton River is a major tributary to the Naches River, entering the Naches River at RM 17.5. The Tieton River is controlled by operations of Rimrock Lake, one of the five major storage facilities within the Yakima Project. Tieton Canal is located 7 miles downstream of Tieton Dam. The Yakima-Tieton Irrigation District operates this canal. Annually, the Yakima-Tieton Irrigation District has water entitlements to 115,049 acre-feet, two-thirds of which is non-proratable (Reclamation, 2006). The Tieton River is affected by releases for irrigation in spring and summer and the “flip-flop” operation in September and October (Section 2.3.4.1). This causes flow in the Tieton River reach to be much lower or higher than unregulated flow, depending on the season (Reclamation, 2002).

3.3.3.5 Tieton River above Rimrock Lake

The North and South Forks of the Tieton River are located above Rimrock Lake and their confluence is inundated by the reservoir. Clear Creek and Indian Creek are tributaries of the North Fork. The South Fork provides 36 percent of the total flow to the Tieton River, and the North Fork, Clear Creek, and Indian Creek provide 47 percent of the total flow to the

Tieton River. Flow is largely unregulated for the Tieton River above Rimrock Lake. Clear Lake Dam is located on Clear Creek, upstream of Rimrock Lake, and has a capacity of 5,300 acre-feet.

Tieton Dam is currently a barrier to fish passage. Clear Lake Dam is a partial barrier to fish passage, impeding upstream passage of adults at the dam spillway at certain flows. If fish passage structures were installed in Tieton Dam and improved at Clear Lake Dam, approximately 36.8 miles of spawning and rearing habitat would become available (Section 2.3.2) (Reclamation, 2005a).

3.3.3.6 Lower Naches River Reach

The lower Naches River reach is located on the Naches River beginning downstream of the confluence with the Tieton River and ending at the confluence with the Yakima River. Stream flow within the lower Naches River reach is controlled by Bumping Lake and Rimrock Lake operations. In September, during the "flip-flop" operation, flows from Rimrock Lake are increased to supply September and October irrigation demand below the confluence of the Naches and Yakima Rivers. This operation causes flow in the lower Naches River reach to be much higher than it would be with unregulated flow (Reclamation, 2002). More operation details are provided in Section 2.3.2 of the January 2008 Draft Planning Report/EIS.

3.3.3.7 Cowiche Creek

Cowiche Creek enters the lower Naches River at RM 2.7. The South Fork and the mainstem portions of Cowiche Creek are suitable for salmonid rearing, even with irrigation withdrawals that occur. The North Fork of Cowiche Creek is intermittent between the mouth and the town of Cowiche except during spring runoff and French Canyon Dam operational spills (Haring, 2001; Tayer, 2009).

3.3.4 Other Yakima River Tributaries

Additional tributaries of the Yakima River may be affected by the Water Resource Management Alternative described in this Supplemental Draft EIS. These tributaries, listed in Table 2-2, typically have low stream flow in the lower reaches caused by irrigation and other water withdrawals. The tributaries are primarily fed by snow melt and peak flows typically occur in the spring and early summer.

The Watershed Assessment for the Yakima River basin summarizes information collected on surface water quantity in the basin (EES et al., 2001). The analysis reports that in the upper portion of the Yakima basin, the largest tributaries are the Teanaway River, Swauk, Big, Wilson, Naneum, Cherry, Taneum, Manastash and Umtanum Creeks. Most of these tributaries have headwaters located in high elevation areas in the Wenatchee National Forest and the majority of their runoff is derived from snowmelt. The streamflow in all of these streams except Big and Umtanum Creeks are heavily influenced by diversions for irrigation. The streamflow for the lower portion of Wilson Creek is influenced by return flows from irrigated areas near Ellensburg. Other tributaries of interest that are located above Yakima Project reservoirs include the Cle Elum River and Gold Creek.

The largest tributaries in the mid-Yakima River basin are Wenas, Selah, Lmuma, Wide Hollow, and Ahtanum Creeks. The Ahtanum Creek headwaters are located in high elevation areas at the north end of the Yakama Nation Reservation. The headwaters of Wenas, Selah, Lmuma, and Wide Hollow Creeks are located at lower elevations and therefore produce less runoff. Streamflow in the lower reaches of Ahtanum Creek is heavily influenced by irrigation withdrawals, with most of the water withdrawn by either the Ahtanum Irrigation District or the Yakama Nation for the Wapato Irrigation Project. Wenas Creek contains a small storage reservoir and is also heavily influenced by irrigation withdrawals. Selah, Lmuma, and Wide Hollow Creeks have smaller amounts of surface water withdrawals (EES et al., 2001).

In addition to the tributaries listed in Table 2-2, Big Creek and Little Creek may be affected by this proposal. Four tributaries (Bumping River, Tieton River, Cowiche Creek, and Indian Creek), are tributaries of the Naches River and are described in Section 3.3.3. The Cle Elum River was described in Section 3.3.2.1 and is not described below. Big Creek, Little Creek, and the other 15 tributaries listed in Table 2-2 are described below.

3.3.4.1 Teanaway River

The Teanaway River has a drainage area of 244 square miles and flows into the Yakima River at RM 176.1. Although in the past there were problems with low flows during the summer and fall in the lower mainstem and in the Middle and West forks, flows in the lower mainstem have been addressed. Although Middle and West fork flows are low, they are do not go dry and are passable (Johnston, personal communication, 2008b). High flow variation also exists naturally; this factor has increased due to extensive logging in the upper watershed. Water uses include diversions for seasonal irrigation, stockwater, and domestic water supply. Low flows in the later summer and early fall do not allow access for salmon spawning most years. Summer flows are adequate for 15 miles of the North Fork and 9 miles of the Middle Fork of the Teanaway River (Haring, 2001).

Modifications to irrigation diversions have been implemented to reduce diversions and increase stream flow in the Teanaway River. However, there has been an increase of residential development and drilling of exempt wells. These wells may be in continuity with the river, which may affect the instream flow improvement efforts associated with the irrigation modifications (Haring, 2001).

The Teanaway River has two current gages that measure stream flow as part of Reclamation’s Hydromet network described in Section 3.3.1. One gage is located at Forks near Cle Elum; the other gage is located below Lambert Road.

Jack Creek is a tributary to the North Fork of the Teanaway River. Some sections of Jack Creek are confined by U.S. Forest Service roads.

3.3.4.2 Swauk Creek

Swauk Creek has a drainage area of 100 square miles and flows into the Yakima River at RM 169.9. Precipitation in the basin is low and therefore unregulated summer flows are low.

Lower Swauk Creek has low stream flow during the late summer and early fall that are naturally occurring, but also partly caused by historic mining and channel alterations. There are also a number of diversions on Swauk Creek and its tributaries that may cause the creek to have very low or intermittent flow up to RM 6. Ten diversions on Swauk Creek have water rights totaling 13.8 cfs and 32 diversions on tributaries of Swauk Creek have water rights totaling 17.4 cfs. Some diversions are no longer in place and some may not be able to divert the maximum amount due to insufficient water availability in the summer and early fall (Haring, 2001; Tayer, 2009). Some diversions on Swauk and First Creeks have been dedicated to instream flow purposes through acquisition from the MountainStar Resort.

Ecology has a stream gage on Swauk Creek located at RM 5. Flow data at the mouth of Swauk Creek are available for July to October 2001. Flows at the mouth of Swauk Creek ranged from being dry in August and September to 3 cfs in mid-October (Montgomery Water Group, 2002).

3.3.4.3 Taneum Creek

Taneum Creek enters the Yakima River at RM 166.1. It is located northwest of the city of Ellensburg. The surface water rights allotted to water users along Taneum Creek total 11,834 acre-feet (CH2M Hill, 2001).

Taneum Creek is listed on Ecology's current 303(d) list (Listing #5786) for instream flow under Category 4c, meaning that the water body is impaired by a non-pollutant. The U.S. Fish and Wildlife Service recommended minimum instream flows of 15 cfs during July and August and 10 cfs during September. These flows are met less than 5 percent of the time. Of four main diversions, Taneum Ditch at RM 2.4 removes most of the water in Taneum Creek (Ecology, 2005a). Ecology operates a stream gage on Taneum Creek that is located at RM 4.

3.3.4.4 Manastash Creek

Manastash Creek enters the Yakima River at RM 154.5. It is located southwest of the city of Ellensburg. Manastash Creek has water diverted for irrigation purposes during the irrigation season. Peak allowable diversions occur during April, May, and June and total 88 cfs. From July through October, the allowable diversions total 45 cfs. Approximately 26,000 acre-feet in surface water rights are allotted to water users along Manastash Creek. These diversions have created low flows or dewatered reaches of Manastash Creek. During average years, flow in Manastash Creek exceeds allowable diversions during April through June; however, an insufficient volume of water is available from Manastash Creek during July through October to supply allowable diversions. In the irrigation season, approximately 20,000 acre-feet is available for irrigators (Yakama Nation and BPA, 2002).

Manastash Creek is listed on Ecology's current 303(d) list (Listing #5784) for instream flow under Category 4c. The U.S. Fish and Wildlife Service recommended minimum instream flows of 20 to 55 cfs from July through November. These flows were not met on any days during 1981 and 1989. In August 1988, Manastash Creek was dry between RM 1.5 and 3.0 and between RM 3.3 and 4.9. Also, all reaches below Manastash Ditch (RM 5.7) had a flow rate that was lower than natural (Ecology, 2005a). Ecology operates a stream gage that is located at RM 5.6.

3.3.4.5 Wilson and Naneum Creeks

Wilson Creek has a drainage area of 408 square miles. It flows into the Yakima River at RM 147. Naneum Creek is a major tributary of Wilson Creek, draining into Wilson Creek at RM 20. Cherry Creek is another major tributary of Wilson Creek, draining into Wilson Creek at RM 0.5. Coleman Creek is a smaller tributary of Wilson Creek. The Wilson Creek drainage area includes much of the Kittitas Valley agricultural area. The Kittitas Reclamation District (KRD) system adds high amounts of flow (several hundred cfs) during the irrigation season through delivery spills, return flows, and ground water augmentation from flood/rill irrigation. Flows in Wilson and its tributaries are typically highest in April and May and lowest in August and September (Haring, 2001).

3.3.4.6 Big Creek

Big Creek is located west of Cle Elum. The total surface water right for Big Creek water users is 1,464 acre-feet (CH2M Hill, 2001).

Stream flow measurements are available for 2001 from May to October. During this year, irrigation diversions and seepage loss to ground water were major factors in flow reductions in Big Creek. Irrigation diversions ranged from 2 to 8 cfs during the measurement period. Natural stream flow in Big Creek (collected from a location above the upstream diversion) ranged from 160 cfs in May to 9 cfs in September. Seepage from the stream into ground water was estimated to be 3 to 4 cfs in July and August. During August and September, the flow in Big Creek below the downstream diversion (downstream of I-90) was less than 1 cfs (Montgomery Water Group, 2002).

Big Creek is listed on Ecology’s current 303(d) list (Listing #5783) for instream flow under Category 4c. Big Creek was found to have sufficient summer flow (3 to 15 cfs in 1989) above the upper diversion, but no more than 1 cfs directly downstream of the upper diversion. Ground water returns to the creek until the lower diversion, which removes the water, causing Big Creek to be essentially dry from the lower diversion to the mouth (Ecology, 2005a). Ecology operates a stream gage that is located at RM 1.3.

3.3.4.7 Little Creek

Little Creek is located west of Cle Elum. The total surface water right for Little Creek water users is 462 acre-feet (CH2M Hill, 2001). Little Creek was considered for Ecology’s 303(d) list for insufficient instream flow based on input from the Yakama Nation, but insufficient documentation was available (Haring, 2001).

3.3.4.8 Reecer Creek

Reecer Creek flows into the Yakima River at RM 153.7. Perennial stream flow exists in the headwaters of Reecer Creek, but surface flow is intermittent during the late summer from the canyon base to the Highline Canal. Dry reaches also occur downstream. Irrigation water is delivered to Reecer Creek through KRD canals, Cascade canals, Town Ditch, and Reed-Mill Ditch (Haring, 2001).

Stream flow measurements are available for 2001 from July to October upstream of Dolarway Road. During that year, flow in Reecer Creek at this location ranged from 6 cfs in October to 32 cfs in August (Montgomery Water Group, 2002).

3.3.4.9 Ahtanum Creek

Ahtanum Creek flows into the Yakima River at RM 106.9. Stream flow is typically high during late spring and early summer and lower during late summer and early fall.

The upper reach of Ahtanum Creek consists of the South and North Forks. The North Fork is the larger of the two and provides surface water to the Johncox and Shaw Knox Ditches for irrigation. Mean flow in the North Fork of Ahtanum Creek ranges from 20 cfs in September and October to 190 cfs in May. South Fork mean flows range from 7 cfs in September and October to 46 cfs in May (Ecology, 2005b).

The mainstem of Ahtanum Creek begins at the confluence of the South and North Forks and ends at the confluence with the Yakima River. Stream flows are influenced by surface water flows from the upper watershed, diversions for irrigation, runoff, and seepage losses and gains. Flow records from a gage operated by USGS at Union Gap show mean monthly stream flows range from 16 cfs in August to 169 cfs in May (Ecology, 2005b).

Irrigation diversions are operated by the Ahtanum Irrigation District (AID) and the Wapato Irrigation Project (WIP). The AID diverts surface water for irrigation from March until July 10. In 2002, the average diversion ranged from 14 cfs in March to 30 cfs in May. The WIP currently diverts water mostly during the late spring and early summer (Ecology, 2005b).

The WIP previously diverted all or most stream flow at RM 19.6 from July 10 to mid-October. This caused Ahtanum Creek to be dry for 7 to 8 miles (Haring, 2001). However, recent changes in the amount and schedule of surface water diversions have resulted in maintaining a continuous flow in the creek. Flows have still dropped below 10 cfs in the late summer below the AID and WIP diversion locations (Ecology, 2005b).

3.3.4.10 Wide Hollow Creek

Wide Hollow Creek flows into the Yakima River at RM 107.4. The watershed is approximately 22 miles in length. Instream flows were considered to be excellent during a 1988 habitat survey, ranging from 3 to 4 cfs near RM 14 to 20 to 30 cfs in the lower 4 miles of Wide Hollow Creek. Median flow is estimated to be 25 cfs at the mouth. Wide Hollow Creek flows are affected during the irrigation season by inflow from Yakima-Tieton Irrigation District operations (Haring, 2001).

3.3.4.11 Toppenish Creek

Toppenish Creek has a drainage area of 612 square miles and flows into the Yakima River at RM 80.4 (Yakima Subbasin Fish and Wildlife Planning Board, 2005). Toppenish Creek has historically been dry from mid-June to mid-October due to irrigation diversions at the Toppenish Lateral Canal diversion at RM 44.2. Recently, instream flows of 10 cfs have been adhered to, but natural seepage into the Toppenish Creek/Mill Creek alluvial fan has been as much as 18 cfs, resulting in a dry reach for several miles until WIP return flows enter Toppenish Creek (YBFWRB, 2008).

3.3.4.12 Satus Creek

Satus Creek has a drainage area of 625 square miles, approximately 10 percent of the Yakima River basin area (Yakima Subbasin Fish and Wildlife Planning Board, 2005). It flows into the Yakima River at RM 69.6. Stream flow in Satus Creek is essentially unregulated. Previous irrigation diversions have been shut down since 1991 to protect instream flows. However, Satus Creek can still dry up in dry summers within the alluvial reach upstream of the confluence with Logy Creek at RM 23.6 (YBFWRB, 2008).

3.3.5 Yakima River Flow Issues

The management of water supply in the Yakima River basin has changed the flow regime away from an unregulated state to a regulated state with effects on anadromous and resident fish. Table 3-4 provides a comparison of the current flow regime to an unregulated flow regime for upper Yakima River reaches, middle Yakima River reaches and lower Yakima River reaches, respectively. In general, spring flows in the middle and lower Yakima River reaches are not sufficient to optimize survival of out-migrating smolts, summer flows downstream of Sunnyside Dam are less than ideal for salmonid habitat and proper riparian function. High flows also persist during the summer in the upper Yakima River reaches that affect juvenile salmonid rearing habitat (Reclamation, 2008c). The annual later summer “flip-flop” operation disrupts salmonid habitat spatially and has impacts to aquatic insect populations while winter flows in the upper Yakima and Cle Elum River are low potentially impacting survival of over-wintering juvenile salmonids (Reclamation, 2008c).

Table 3-4 Comparison of Current Stream Flow Regime to Unregulated Stream Flow Regime – Upper, Middle, and Lower Yakima River

	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
Season	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River	Swauk Creek	Taneum Creek	Manastash Creek	Naneum Creek	Wilson Creek
Winter (Oct-March)	Flow is unregulated	Flow is reduced and is less variable	Flow is unregulated	Flow is reduced and is less variable	Flow is reduced	Flow is unregulated	Flow is unregulated	Flow is unregulated	Flow is reduced	Flow is reduced	Flow peaks are higher	Flow is unregulated	Flow is unregulated	Flow is unregulated	Flow is unregulated	Flow is unregulated
Spring (April-June)	Flow is unregulated	Flow is reduced	Flow is unregulated	Flow is reduced	Flow is reduced	Flow is slightly reduced	Flow is slightly reduced	Flow is unregulated	Flow is reduced	Flow is reduced	Flow peaks are higher	Flow is slightly reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced
Summer (July-Sept)	Flow is unregulated	Flow is greatly increased until early Sept flip-flop	Flow is unregulated	Flow is greatly increased, especially during mini flip-flop	Flow is increased until early Sept flip-flop	Flow is greatly reduced and dry in some areas	Flow is unknown, but likely reduced	Flow is unregulated	Flow is greatly increased until early Sept flip-flop	Flow is greatly increased until early Sept flip-flop	Flow is reduced	Flow is reduced and dry in some areas	Flow is greatly reduced	Flow is greatly reduced	Flow is dependent on KRD return	Flow is dependent on KRD return

	Middle Yakima River from Roza Dam to Prosser Dam																Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
Season	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Winter (Oct-March)	Flow is reduced	Flow is unregulated	Flow is regulated	Flow is mostly unregulated	Flow is unregulated	Flow is reduced	Flow is reduced	Flow is unregulated	Flow is greatly reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is unregulated	Flow has higher peaks	Flow is reduced	Flow is reduced
Spring (April-June)	Flow is reduced	Flow is unregulated	Flow is reduced	Flow is mostly unregulated	Flow is unregulated	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is reduced	Flow is unregulated	Flow is reduced	Flow is reduced
Summer (July-Sept)	Flow is greatly increased	Flow is unregulated	Flow is increased	Flow is mostly unregulated	Flow is unregulated	Flow is increased starting early Sept for flip-flop	Flow is increased starting early Sept for flip-flop	Flow is reduced	Flow is increased but moderated by RID diversions	Flow is increased	Flow is greatly reduced	Flow is slightly increased	Flow is reduced to target flow at Parker	Flow is reduced	Flow is reduced	Flow is reduced	Flow is greatly reduced	Flow is reduced

3.3.6 Columbia River

The Columbia River is the terminus of the Yakima River. Changes to the Yakima River will affect the Columbia River downstream of the confluence of the Yakima and Columbia Rivers (Columbia RM 335.2).

The Columbia River originates in two lakes that lie between the Continental Divide and Selkirk Mountains in British Columbia. The river flows over 1,000 miles before reaching the Pacific Ocean. It flows north for its first 200 or more miles, and then turns south toward the Canada-U.S. border. Within the U.S., the river flows southwest, skirting one of the Columbia Plateau's massive basalt flows, before turning southeast and cutting through a dramatic gorge in the volcanic shield near its junction with the Snake River. From its confluence with the Snake River, the Columbia River runs nearly due west to the Pacific Ocean (Ecology, 2007a).

The Columbia River's annual discharge rate at The Dalles fluctuates with precipitation, ranging from 120,000 cfs in a low water year to 260,000 cfs in a high water year. Average annual discharge at The Dalles is 138 million acre-feet or about 190,000 cfs (Ecology, 2007a).

Tributaries to the Columbia River basin are primarily snow-fed (i.e., precipitation falls mainly as snow). These tributaries typically have low winter flows and strong spring and summer peaks with snowmelt, which concentrates about 60 percent of the natural runoff to the Columbia River during May, June, and July. Tributaries that are fed by glacial melt in addition to snow pack along the Cascade Range or in Canada exhibit a different flow pattern. Glaciers contribute a considerable amount of flow to rivers during late summer and early fall after the snow has melted and when precipitation is normally low (Ecology, 2007a).

3.3.7 Irrigation

Irrigation is discussed in detail in Sections 2.2.1, 2.3.2, and 4.2.1 of the January 2008 Draft Planning Report/EIS and will not be discussed in this chapter.

3.4 Water Rights

Section 5.2.2 of the January 2008 Draft Planning Report/EIS described water rights in the Yakima River basin, including federal tribal reserved water rights and the Yakima Adjudication in Yakima County Superior Court. Special issues regarding irrigation districts were also discussed. Three aspects of the alternative being considered in this Supplemental Draft EIS require additional discussion of water rights—operational changes at existing facilities, expansion of Bumping Lake, and construction of Pine Hollow reservoir.

3.4.1 Operational Changes at Existing Facilities

One component of the Integrated Water Resource Management Alternative includes proposals to change operations at Roza Dam and the Chandler Power Plant. The court in the Adjudication confirmed three power generation rights to Reclamation: one right at Roza Dam

Power Plant and two rights at Chandler Power Plant (Amended Conditional Final Order Bureau of Reclamation Court Claim No. 00276, March 12, 2007).

3.4.1.1 Roza Dam

The court confirmed a water right for power production at the Roza Power Plant for 1,123 cfs from the Yakima River. The right has a priority date of May 10, 1905 and may be used year-round. The point of diversion is at the Roza Dam in the Northeast Quarter of the Northeast Quarter of Section 32, Township 15 North, Range 19 East Willamette Meridian in Kittitas County. The power plant is about 10 miles downstream from the diversion point and the place of use is within the Northeast Quarter of the Northeast Quarter of Section 17, Township 13 North, Range 19 East Willamette Meridian.

The court did not confirm an annual quantity because Reclamation operates the plants as run-of-the-river plants when there is surplus water to other needs (i.e., power is supplied by the current of the river only, and not by stored water). According to Reclamation, water is not specifically released from the reservoirs for power generation. The plant is operated by using existing and previously allocated water from the Yakima River (Supplemental Report of the Court Concerning the Water Rights for United States of America, Department of Interior, Bureau of Reclamation, Volume 56A, December 4, 2006).

The court placed three conditions on the water right:

> Reclamation will not release water from storage or divert water to the detriment of co-equal priority irrigation, municipal or industrial water rights in order to generate electric power at Roza hydroelectric plant.
>
> Within the over-all limit of 2,200 cubic feet per second on maximum combined diversion for irrigation and power use (power use under Certificate of Adjudication Water right [sic] No. ___) at the Roza headworks, diversions for Roza Division irrigation purposes shall be given preference. Subject to the foregoing qualifications and to the availability of water and limitations on canal capacity, maximum diversions up to 1,123 cubic feet per second may be made for power purposes under certificate of Adjudication Water Right No. ___. [The blanks will be filled in by Ecology when it issues the adjudicated certificates of water right.]
>
> The source of water for this water right is the total water supply available, defined in the 1945 Consent Judgment as "that amount of water available in any year from natural flow of the Yakima River and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources.

3.4.1.2 Chandler Power Plant

The court confirmed two water rights for power generation to Reclamation for the Chandler Power Plant. The first is for the diversion of 210 cfs from the Yakima River. The right has a priority date of April 4, 1899 and a season of use from April 1 through October 31. The point of diversion for both rights is the Northeast Quarter of the Northeast Quarter of section

2, Township 8 North, Range 24 East Willamette Meridian. The place of use is within the Northeast Quarter of Section 17, Township 9 North, Range 26 East Willamette Meridian.

The court attached the following conditions to this water right:

> Reclamation will not release water from storage or divert water to the detriment of irrigation, municipal or industrial water rights with priority dates senior or equal to May 10, 1905 or migratory fish in order to generate electric power at Chandler hydroelectric plant.
>
> The source of water for this water right is the total water supply available, defined in the 1945 Consent Judgment as “that amount of water available in any year from natural flow of the Yakima River and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources.

The second right is to divert 1,329 cfs from the Yakima River from April 1 through October 31 and 1,539 cubic feet per second from November 1 through March 31. The right has a priority date of May 10, 1905. The court attached two conditions to this water right.

> Reclamation will not release water from storage or divert water to the detriment of co-equal priority irrigation, municipal or industrial water rights or migratory fish in order to generate electric power at Chandler hydroelectric plant.
>
> The source of water for this water right is the total water supply available, defined in the 1945 Consent Judgment as “that amount of water available in any year from natural flow of the Yakima River and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources.

The court did not confirm annual quantities for the water rights for the same reasons as explained for Roza Dam in Section 3.4.1.1.

3.4.2 Bumping Lake Expansion

The Adjudication Court confirmed 13 water rights for Yakima Project storage reservoirs. The water rights for all reservoirs are to be issued to Reclamation “on behalf of itself and other entities to which it is required to supply water from storage” (Amended CFO at 2). For Bumping Lake the water right is to be issued as follows:

> Bumping River and watershed above Bumping Dam. Water is stored in Bumping Lake reservoir with a total active capacity of 38,768 acre-feet. The impounding structure is located within the Northwest Quarter of Section 23, the Southwest Quarter of the Southwest Quarter of Section 14, in Township 16 North, Range 12 East Willamette Meridian.

The court agreed to Reclamation’s request to use the term “total active capacity.” The term includes the design capacity of the reservoirs, a surcharge amount that may be stored by installing flashboards to expand the capacity, and the water stored as Reclamation drafts down the reservoirs to meet demands and then refills the reservoirs during the season (Supplemental Report at 9).

Reclamation also requested that the court not set a cap on the amount of water it can store annually in its reservoirs. Reclamation requested it "be allowed to store an unlimited amount of water based on the prevailing conditions" (Supplemental Report at 10). The court agreed to confirm storage rights and state the total active capacity of the reservoir "with the understanding that greater quantities will be stored and the level in the reservoirs will fluctuate as the United States manages and operates the Yakima Project reservoirs during the water year" (Supplemental Report at 10).

The court also agreed that rather than listing the beneficial use on Reclamation's storage rights the court would place the following condition: "Filling, detention, carryover, release and delivery of water to … Reclamation and entities authorized to receive water from …Reclamation." The specific purpose of use for the water is described on each diversionary water right.

To enlarge the storage capacity in Bumping Lake, Reclamation would need to obtain a new water right. Reclamation's authorization for withdrawal and appropriation of state water is discussed in the January 2008 Draft Planning Report/EIS (Section 2.2.5.2). The May 10, 1905 withdrawal ended on December 31, 1951. Ecology issued a second withdrawal from appropriation in 1981. Ecology in response to Reclamation's requests has extended the withdrawal several times. The most recent extension was issued by Ecology on January 14, 2003 and granted an extension to January 18, 2013.

The Order and Determination Granting Application stated that Reclamation had applied for the extension to "allow for continued examinations, surveys and investigations related to the Yakima River Basin Water Enhancement Project." The Order and Determination also stated that Reclamation, the State of Washington, the Yakama Nation and the irrigation districts continued to work together to work toward comprehensive water management and that water rights for various elements will be required. Based on these and other considerations the extension was granted.

3.4.2.1 Ahtanum Creek Watershed Restoration Program

The surface water rights in the Ahtanum Creek watershed are being adjudicated by the Yakima County Superior Court. The outcome of the adjudication will have a direct bearing on water available for Pine Hollow reservoir. The following discussion is taken in part from that prepared for the Ahtanum Creek Watershed Restoration Program Final EIS (Ecology, 2005a) and updated as appropriate.

Water users in the Ahtanum Creek watershed have both surface water and ground water rights. These water rights are a mixture of state-based water rights, federal tribal reserved water rights, water rights held by individual tribal allottees and their successors, and water rights held separately by individuals or through an entity such as an irrigation district. This mixture of water rights is determined by and subject to state and federal laws, laws specific to irrigation districts, and Reclamation policies and regulations.

The combination of water right claimants and the history of legal proceedings in the Ahtanum Creek watershed create a complex scenario. The primary water right claimants are designated Southside water users and Northside water users. The Southside water users include the Yakama Nation, who claim a tribal federal reserved right to water for irrigation of the reservation lands to the south of Ahtanum Creek and who also share that water on a pro-rata basis with tribal allottees of land on the reservation and non-tribal successors to the lands of allottees. The Northside water users include the AID, Johncox Ditch Company, and individual water right holders. All water rights for out-of-stream uses are junior to the Yakama Nation's treaty right for fish and other aquatic life, which has a priority date of time immemorial.

Water rights in the Ahtanum watershed have been the subject of federal and state proceedings since 1908. As the court noted in its Report of the Court, quoting the Trial Brief of AID, "[t]he Ahtanum area has produced more litigation per gallon of water involved, than any other irrigation district in the State of Washington, maybe the United States" (Report at 35). In 1908, the Chief Engineer of the Bureau of Indian Affairs, W.H. Code, fashioned an agreement between the United States on behalf of the Yakama Nation, and the non-tribal landowners on the north side of the creek (the Code Agreement). The agreement called for the Northside water users to have 75 percent of the flow of Ahtanum Creek and the Yakama Nation to get 25 percent of the flow. In the mid-1920s, a state adjudication was conducted, *State of Washington v. Annie Wiley Achepohl, et al.* (*Achepohl),* to adjudicate the rights in the Ahtanum area under state law. In 1947, the United States, on behalf of the Yakama Nation, filed a lawsuit in federal court attempting to undo the 1908 Code Agreement and assert a right to more than 25 percent of the flow. The case was heard in federal District Court and was the subject of two opinions from the U. S. Ninth Circuit Court referred to as Ahtanum I (*United States v. Ahtanum Irrigation District,* 236 F.2d 321 (9th Cir. 1956)) and Ahtanum II (*United States v. Ahtanum Irrigation District*, 330 F.2d 897 (9th Cir. 1964)) (also known as the Pope Decree).

The Yakima County Superior Court issued a Report of the Court Concerning the Water Rights for Subbasin No. 23 (Ahtanum Creek), Ahtanum Irrigation District, Johncox Ditch Company and United States/Yakama Nation on January 31, 2002 (Report of the Court). The court subsequently issued a Memorandum Opinion Re: Ahtanum Creek Threshold Legal Issues (Memorandum Opinion) prior to holding an exceptions hearing on its Report of the Court. The exceptions hearing was held in February 2004 and a Supplemental Report of the Court and a Proposed Conditional Final Order Subbasin No. 23 (Ahtanum) were issued on February 25, 2008. Parties took exception to the Supplemental Report and the court held a hearing on exceptions in late October 2008.

On April 15, 2009 the court entered a Memorandum Opinion Exceptions to the Supplemental Report of the Court and Proposed Conditional Final Order Subbasin No. 23 (Ahtanum) (Memorandum Opinion 2009).[1] The Court certified the Conditional Final Order for

[1] The Court issued an Order Ruling on Certain Exceptions to the Supplemental Report of the Court/Proposed Conditional Final Order on October 14, 2008. In its order the Court addressed exceptions that could be ruled on without hearing. Primarily those exceptions involved corrections to technical details of the water rights, not legal issues.

immediate appeal and denied Ecology's request to delay entry of the Conditional Final Order until the time the Court enters the final decree for the entire adjudication. This way any objections to the Conditional Final Order will be resolved prior to the final decree. Several parties, including the Yakama Nation, the United States, and Ahtanum Irrigation District have filed notices of appeal of the Court's Conditional Final Order to Division III of the Washington State Court of Appeals. The issues in Ahtanum will not be resolved until the appeals have been heard. The key issues addressed by the adjudication court are discussed below.

Ever since the 1908 Code Agreement, a primary question regarding the water rights in the Ahtanum watershed is how the available water in the creek is split between the Southside water users and the Northside water users. The key ruling on this issue is in Ahtanum II and reads as follows:

> [I.] b. To plaintiff [United States], for use on Indian reservation lands south of Ahtanum Creek, twenty-five percent of the natural flow of Ahtanum Creek, as measured at the north and south gauging stations; provided that when that natural flow as so measured exceeds 62.59 cubic feet per second, all the excess over that figure is awarded to plaintiff, to the extent that such water can be put to beneficial use.
>
> ***
>
> II. After the tenth day of July in each year, all the waters of Ahtanum Creek shall be available to, and subject to diversion by, the plaintiff for use on Indian Reservation Lands south of Ahtanum Creek, to the extent that said water can be put to beneficial use (330 F.2d 897, 915).

Several central water right issues in the Ahtanum involve excess water. The court defines excess water as water that exists prior to July 10 when the flow in Ahtanum Creek exceeds 62.59 cfs and (1) the on-reservation water users are not using that excess water, and (2) the excess water is not being used to maintain fish life. The issues regarding excess water are whether it exists; if so, how it is to be calculated; and who gets to use it. The issue of junior water rights is directly tied to that of excess water.

The court in the ongoing Yakima Adjudication considered all of the historical proceedings and concluded that to receive a senior water right[2] in the current adjudication, a claimant must show that (1) a predecessor who owned the water right was a signatory to the Code Agreement; (2) a predecessor had the water right confirmed in *Achepohl;* and (3) the right was confirmed again in Ahtanum II. If all three of these factors are not satisfied, the claimant may still be confirmed a junior right[3]. The court determined that it would award a junior right to a claimant who is a successor to a signatory to the Code Agreement and is in

[2] A senior water right has an older priority date and receives its full irrigation allotment prior to water rights holders with a newer or "junior" priority date.

[3] A junior water right has a newer priority date and only receives irrigation water when the allotments of all senior water rights holders have been met.

compliance with the *Achepohl* decree, but who was not properly included as a defendant in Ahtanum II. In the Supplemental Report the court withdrew its earlier confirmation of junior rights and found that "north side users are estopped from claiming any right to 'excess' flows, except for use on specific lands included in or deriving from" a claim recognized in Ahtanum II (Supplemental Report at 29-30). The Court affirmed this ruling in the Memorandum Opinion 2009. Junior rights- rights to irrigate lands not included in the Pope Decree—cannot be recognized by the Court in the Yakima adjudication.[4]

The court in the Supplemental Report had concluded that Ahtanum II limited the quantity of water for lands on the north side to 0.01 cfs for each irrigated acre. The annual quantity to be warded to lands on the north side is based on a continuous diversion of 0.01 cfs from April 15 until July 10 or 1.72 acre-feet per acre irrigated. A more complete discussion of the water rights legal issues was included in Appendix B to the Ahtanum Creek Watershed Restoration Program Final EIS (Ecology, 2005a).

In the Court's Memorandum Opinion 2009, the Court affirmed that any excess water not needed and beneficially used by the Yakama Nation is available for use by the north-side water users, but not for junior water right lands. Additionally, excess water may be used by the north-side water users up to a total of 0.02 cfs/acre. The Yakama Nation is entitled to take all water in the creek over and above what the north-side water users are entitled to divert plus what is necessary for the Yakama Nation's instream flow right (Memorandum Opinion 2009).

The court had previously ruled that the Yakama Nation's water right is for 3,306.5 historically irrigated acres plus 1,840.35 future acres for a Practically Irrigable Acreage (PIA) total of 5,146.85. The court has established a water duty, the amount of water necessary to irrigate an acre of land, of 4.4 acre-feet/acre. The total annual quantity of water to irrigate the PIA is therefore 22,646.13 acre-feet. The PIA total is based on the capacity of the Wapato Irrigation Project (WIP) as designed in 1915. In its Memorandum Opinion 2009 the Court ruled that the maximum acreage to be confirmed on the Yakama Reservation/ south-side is 5,100 acres. The Court subtracted from that lands belonging to individuals who have separately confirmed water rights and concluded that 4,107.61 acres are confirmed to the Yakama Nation. At a water duty of 4.4 acre-feet/acre the total quantity of water is 18.073.48 acre-feet per year. This total is for tribal trust and fee lands, including non-Indian fee holders who are successors to Indian allottees. This includes everyone served by the Wapato Irrigation Project.

The Yakama Nation sought a right to storage from October 2 to March 31. The Court denied the request and found that the two federal court cases, Ahtanum I & II, preclude it. Those cases settled the season of use, annual quantity and acreage based on the system as built in 1915. A request for storage is premature and amounts to a request for a potential future storage right.

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[4] The Court declined to rule whether a water right can be transferred to junior water right lands stating that decision is within Ecology's authority. The Court found nothing in the Pope Decree that prohibits such transfers as along as the transfer statute is followed (Memorandum Opinion, 2009)..

The Yakama Nation's water right for fish was previously confirmed by the Adjudication Court. The right is unquantified but is described as the minimum instream flow necessary to maintain fish life in Ahtanum Creek in light of prevailing conditions. This water right has a priority date of time immemorial and must be met before any other water rights are satisfied. If a storage reservoir is built, the prevailing conditions in Ahtanum Creek would change from those that presently exist, thus creating different conditions for determining the Yakama Nation's instream flow right for fish and other aquatic life.

The Adjudication Court initially ruled that there is a non-diversionary stockwater right, which requires 0.25 cfs to be retained in Bachelor and Hatton Creeks when naturally available. In the Supplemental Report, the Court ruled that the headgates installed by the Ahtanum Irrigation District to control flow of water into the creeks resulted in them being used as irrigation channels. In its Memorandum Opinion 2009, the Court found that after the gates diverting water to Bachelor and Hatton Creeks are closed on July 10, any water that continues to flow into the creeks is available for livestock to drink under the non-diversionary stock water right.

3.4.3 Ground Water Rights

Estimating ground water rights is more difficult than surface water rights. As with surface water rights, anyone who acquired a ground water right prior to adoption of the Ground Water Code (Chapter 90.44 RCW) in 1945 has been required to file a water right claim, which is on record with Ecology. While helpful to a certain extent, these claims represent only what a water right user asserts is their water right; the rights have not been adjudicated and confirmed by a court. For ground water rights acquired after 1945, Ecology has a record of certificates granted. For rights not yet perfected, Ecology has a record of permits issued. The core problem in adequately quantifying and cataloging existing ground water rights is the statutory exemption in RCW 90.44.050. Anyone who constructs a well must file a construction notice with Ecology, but there is very little information regarding the use of the exempt wells. Some exempt wells may no longer be used, and the amount of ground water being withdrawn by those wells still in use is unknown.

The relationship between ground water and surface water is important to managing the water resources and making decisions regarding potential impairment of existing rights by new rights. In areas where there is hydraulic continuity (an exchange of water) between a ground water system and a surface water body, pumping ground water may potentially reduce ground water discharge into surface water, or in extreme cases, divert surface water into a ground water system, thereby reducing flows in surface waters. This could affect established water rights to the surface water source and instream flows for fish. If a well is in one of the few areas where hydraulic continuity does not exist, ground water may be withdrawn with no effect on surface waters. Management of surface waters can also affect the ground water supply. In areas where irrigation occurs, part of the applied irrigation water percolates into the ground and recharges the aquifers. If conservation measures are implemented, this may reduce the amount and/or location of recharge to ground water. According to the *Ahtanum Creek Watershed Assessment* (Golder, 2004), data from 2002 suggest stream/shallow aquifer interaction throughout Ahtanum Creek, with variable exchange of ground water and surface water between the shallow aquifer and streams.

According to the Ecology Water Rights Application Tracking System (WRATS) database, there are active ground water rights to 58,221 acre-feet/year in the Ahtanum basin, which equates to 50 million gallons per day (mgd) or 80 cfs year-round (Golder, 2004). The majority of the wells are located downstream of the AID and WIP diversions in the eastern portion of the watershed. Within the AID service area, it is estimated there are ground water rights totaling 23,280 acre-feet. It is thought that only a small fraction of the wells are likely withdrawing directly from the alluvial aquifer; most use is from the deeper sedimentary and basalt aquifer systems (Golder, 2004).

In 1999 Ecology, Reclamation, and the Yakama Nation agreed to study the ground water resources in the Yakima River basin. The study is intended to better describe the ground water-surface water link, help determine the potential impact on existing water rights when making water right decisions, support efforts to improve instream flows, and estimate when/where/how much ground water pumping affects stream flows. This study is being undertaken by the USGS and preliminary results are available. Until the study is completed, Ecology is withholding permits on ground water applications for new water rights. Ecology may make exceptions for transfers and changes of ground water rights, public health and safety emergencies, and domestic use from exempt wells (Ecology, 1999).

3.5 Ground Water

In cooperation with Reclamation, Ecology, and the Yakama Nation, the USGS is studying the ground water system in the Yakima River basin and how it interacts with rivers and streams in the basin (USGS, 2006). Results of the USGS study will be included in the Final EIS, which will also provide updated information on the ground water storage alternative described in the January 2008 Draft Planning Report/EIS. For this Draft Supplemental EIS, the description of ground water resources focuses on the areas that would be affected by the Integrated Water Resource Management Alternative. Those areas include the five storage reservoirs and some of the Yakima River tributaries.

3.5.1 Cle Elum Dam

Ground water near Cle Elum Dam is contained within the Cle Elum basin of the Roslyn basin (Kinnison and Sceva, 1963). Ground water upstream of the lake discharges into the lake or its tributaries. Downstream, the ground water in unconsolidated materials is recharged by precipitation and discharge from the reservoir. The aquifer drains to the Yakima River downstream from Swauk Creek (Kinnison and Sceva, 1963).

3.5.2 Keechelus Dam

Ground water near Keechelus Dam is contained within the Keechelus basin. Ground water upstream of Keechelus Lake discharges into the lake or its tributaries. Downstream, the ground water in the valley deposits is recharged by local precipitation and by subsurface discharge from the lake. The basin discharges into the Yakima River above the southeastern end of the basin (Kinnison and Sceva, 1963). The porosity and hydraulic conductivity of the pre-Miocene rock units may limit ground water storage and well yield (WSDOT and FHA, 2005).

3.5.3 Kachess Dam

Ground water near Kachess Dam is contained within the Kachess basin of the Roslyn basin. Ground water upstream of Lake Kachess discharges into the lake or its tributaries. Downstream, the ground water in the valley deposits is recharged by local precipitation and by subsurface discharge from the lake. The basin primarily discharges into the Yakima River above the downstream boundary of the basin, but a small quantity discharges as underflow (Kinnison and Sceva, 1963).

3.5.4 Bumping Lake Dam

Ground water near Bumping Lake Dam is contained within the Bumping Lake basin of the upper Yakima River basin. Bedrock within the basin has low permeabilities. The water-bearing units in the valleys typically consist of Quaternary-age permeable sands and gravels. Subsurface leakage from the lake recharges sediments underlying the valley downstream of the dam (Kinnison and Sceva, 1963).

In 1952, holes drilled near the right abutment of the dam indicated that the ground water table is at a depth of approximately 53 feet. The water table adjacent to the dam was determined to be at an approximate depth of 22 feet. According to Reclamation (2006) no drill has been conducted at the reservoir.

3.5.5 Tieton Dam

Tieton Dam and Rimrock Lake are contained in the upper Tieton River watershed (USFS, 2007). According to well logs obtained from Ecology’s well log database, ground water near Tieton Dam and Rimrock Lake is contained within a fractured basalt aquifer. Ground water is suspected to discharge through the Tieton River to the Naches River valley.

3.5.6 Manastash Creek

Ground water in the Manastash Creek area is found in alluvial sediments, the Ellensburg Formation, and the deeper basalts (Golder, 2004). Ground water in the alluvial sediments is in direct hydraulic continuity with Manastash Creek. Seepage losses to ground water from the Kittitas Reclamation District (KRD) canal system have been documented, but there is uncertainty regarding the magnitude and net water balance from these seepages. Significant ground water flow and storage also occurs in the underlying Ellensburg and Columbia River Basalt Group formations.

3.5.7 Bumping River

The Bumping River is part of the upper Naches basin. The Bumping River gage is bypassed by ground water moving through the alluvium. That is, because a stream gage is only able to measure water moving above ground surface, water moving through the alluvium aquifer unit (underground) is not measured. The majority of the bypass flows originated from Bumping Lake. No known subsurface return flows or ground water withdrawals were identified (Kinnison and Sceva, 1963).

3.5.8 Tieton River

The Tieton River is part of the Upper Naches Basin. All three Tieton River gages are also bypassed by ground water moving through the alluvium. According to Kinnison and Sceva (1963), a "very small" amount of ground water withdrawal for domestic use was reported in the vicinity of the dam. Although the authors do not provide quantities, small domestic ground water withdrawals typically occur through exempt wells which limit users to a maximum of 5,000 gallons per day. In addition to domestic ground water withdrawals, a small amount of return flow by ground water discharge (from upstream irrigation) occurs approximately two miles upstream from the river's mouth. Ground water in this area is withdrawn for domestic use (Kinnison and Sceva, 1963).

Basalt underlies most of the Tieton River with little underlying alluvial material. Ecology (2006) reported no measurable ground water discharge to the upper 8 miles of the Tieton River, and no loss from the river to the ground water. The lower 6 miles of the Tieton River showed both flow losses and gains to the ground water system on the order of 5 to 10 percent of the measured stream flow. The highest flow losses (recharge to the ground water) occur on the lower three miles of the river.

3.5.9 Ahtanum Creek

Detailed analysis of ground water conditions in the Ahtanum Creek area is described in Golder (2004). The stratigraphy of the Ahtanum Valley consists of recent alluvium and fluvial sand and gravels deposited over late-Tertiary volcanic and fluvial sediments (Upper Ellensburg Formation). These sediments are underlain by rocks of the Columbia River Basalt Group, a sequence of Miocene-age flood basalts. The floor of the Ahtanum Valley is mantled by Quaternary alluvial sediments which consist mostly of unconsolidated deposits of well-rounded cobbles, gravel, and sand with discontinuous bodies of silt and clay. The thickness of the alluvial sediments, as determined from well logs, generally ranges from 2 to 40 feet, with the thickness of the deposits increasing eastward toward the Yakima River.

The Ellensburg aquifer is recharged directly from precipitation where it is exposed at the surface, indirectly by downward infiltration from the overlying alluvial sediments, and indirectly from upward discharge from the Columbia River Basalt Group. Hydraulic gradients in the Ellensburg Formation appear to transition from downward to upward gradients somewhere in the vicinity of South Wiley Road.

3.5.10 Toppenish Creek

The Yakama Nation Water Resources Program has conducted an evaluation of over 500 well logs in the White Swan region, which includes the middle reach of Toppenish Creek. They estimated that approximately 80 percent of the existing wells may have been installed in a substandard manner with inadequate seals. They concluded that inadequately sealed wells may be allowing the shallow and deep aquifers to mix and thereby contributed to the disappearance of springs, small streams, and riparian areas through the draining of the shallow aquifers into the deeper wells.

3.6 Water Quality

3.6.1 Reservoir Water Quality

As shown in Table 3-1, the physical characteristics of the five major Yakima River basin reservoirs vary. These physical characteristics can influence water quality. Bumping Lake is much shallower and has a higher ratio of average annual runoff to active storage capacity than the other four impoundments (6.2:1 compared to 0.9:1 to 1.8:1 for the other four impoundments). This indicates faster routing of water through the lake. During a wet water year, Bumping Lake may have a residence time of less than 20 days (Lieberman and Grabowski, 2007).

Limnological studies (a study of the biological, chemical, meteorological, and physical aspects of lakes) conducted by Reclamation have shown temperature stratification in all of the storage reservoirs in the basin (USFWS, no date). All of the outlet works for these dams draft water from well below the full pool elevation, although the Tieton Dam outlet is the only one that has an outlet located in the coldest waters available in the reservoir pool (USFWS, no date). All of these impoundments have low productivity and are therefore considered oligotrophic (i.e., having low nutrient and high dissolved oxygen contents) (Lieberman and Grabowski, 2007; Rector, 1996; FERC, 1990).

A limnological study of Cle Elum and Bumping Lakes was conducted between September 2003 and October 2005 to improve the understanding of the physical, chemical, and biological conditions in these two lakes, to assess primary and secondary production, to determine if the present conditions would support introduced anadromous salmonids, and ultimately to determine to what extent anadromous salmonid fish can be restored to the basin (Lieberman and Grabowski, 2007). This study showed that both lakes have water columns that mix twice each year (dimictic) with turnover occurring in or around April and October, and strong stratification occurring from July through September. The maximum temperatures occurred in July, and exceeded 16° C down to a depth of about 50 feet in Cle Elum Lake and about 20 feet in Bumping Lake (Lieberman and Grabowski, 2007).

Both Cle Elum and Bumping Lakes are oligotrophic. As warmer temperatures occur, the water is able to hold less dissolved oxygen (DO). This results in the warm surface layer (epilimnion) having lower DO concentrations than cooler deeper layers. At the deepest stations monitored during this study, both lakes had middle thermal layer (metalimnion) with a maximum DO concentration. This phenomenon is referred to as metalimnetic maximua DO and is typically caused by oxygen produced by algal populations that can develop more rapidly when they sink (Wetzel, 1983). The minimum DO measured in Bumping Lake was approximately 2 milligrams per liter (mg/L) near the bottom compared to a minimum of approximately 6.5 mg/L in Cle Elum Lake (Lieberman and Grabowski, 2007).

The Federal Energy Regulatory Commission (FERC) (1990) reported that Rimrock Lake thermally stratifies in the summer. The upper layer (epilimnion) exceeds the temperature standard in the summer, and then the lake undergoes turnover in mid-September. Dissolved oxygen is generally at or above saturation in the reservoir, although DO has not always met the state standards near the bottom, which is the location of the intake (FERC, 1990).

Adding hydroelectric facilities to the reservoir's discharge has eliminated the use of jet flow gates, which used to aerate the outflows from the dam. Consequently, Ecology required the licensee of the hydroelectric project to include aeration rings upstream of one of the two Francis turbines, monitor DO in outflows from the dam, and ensure that the river satisfies the DO standard (Ecology, 2003b).

Monitoring conducted in 1993 indicated that the upper 30 feet of Keechelus Lake had a temperature of about 16° C and DO of about 10 mg/L (Rector 1996). Keechelus Lake was the only one of the five impoundments that has been included on Washington's 303(d) list of water-quality limited waterbodies since 1996 (Table 3-5). It had 303(d) listings for dioxin and PCBs in 2004 and is currently proposed for listing of those parameters on the 2008 303(d) list.

Table 3-5 Impoundment 303(d) Listings

Water Body	1996	1998	2004	2008 (Draft)
Cle Elum Lake	None	None	None	None
Bumping Lake	None	None	None	Not Listed
Rimrock Lake	None	None	None	None
Keechelus Lake	None	None	Dioxin PCB	Dioxin PCB
Kachess Lake	None	None	None	None

Source: Ecology, 2008

3.6.2 Tributary Water Quality

3.6.2.1 Upper Yakima Tributaries

Although water quality in the upper Yakima River basin is generally much better than in the lower basin, irrigation effluents and flow regulation have adversely affected some areas (Joy, 2002; Joy and Patterson, 1997 as cited in YBFWRB, 2008). The upper Yakima and Cle Elum Rivers, as well as tributaries to the Yakima River in the Kittitas Valley (Cherry, Cooke, Wilson, Taneum, and Manastash Creeks), are 303(d)-listed for numerous water quality problems (Table 3-6) (Ecology, 2008). High stream temperatures have resulted in inclusion on the 303(d) lists, although Ecology has not listed Manastash Creek for temperature (Table 3-6). Ecology (2005c) identified forest practices as nonpoint sources for most of the upper Yakima River basin temperature 303(d) listings, and identified agriculture as a nonpoint source for temperature listings in Wilson, Taneum, and Cooke Creeks. Dams and industrial sources were identified for 303(d) temperature listings in the Yakima River in the vicinity of Cle Elum (Ecology, 2005b).

Table 3-6 Tributary 303(d) Listings

Water Body	Water Quality Parameters			
	1996	1998	2004	2008 (Draft)
Cle Elum River	Temperature	Temperature	Temperature	Temperature
Teanaway River	Temperature Instream Flow	Temperature Instream flow	None	None
Swauk Creek	Temperature	Temperature	Temperature	Temperature
Taneum Creek	Temperature Instream Flow	Temperature Instream Flow	Temperature	Temperature Fecal Coliform Dissolved Oxygen
Taneum Creek (S.F.)	Temperature	Temperature	Temperature	Temperature
Manastash Creek	Instream Flow	Instream Flow	None	pH Fecal Coliform Dissolved Oxygen
Manastash Creek (S.F.)	Temperature	Temperature	Temperature	Temperature
Wilson Creek	Temperature Fecal Coliform	Temperature Fecal Coliform	Temperature Fecal Coliform	Temperature pH
Naneum Creek	Temperature	Temperature	Temperature	Temperature pH
Bumping River	Temperature	Temperature	Temperature	Temperature
Tieton River	None	None	None	Temperature
Cowiche Creek	Temperature Fecal Coliform Instream Flow	Temperature Fecal Coliform Instream Flow	Temperature Fecal Coliform 4,4'-DDE	Temperature pH Fecal Coliform Dissolved Oxygen PCB 4,4'-DDE
Ahtanum Creek	None	None	Fecal Coliform	Temperature Fecal Coliform
Ahtanum Creek (N.F.)	None	None	None	Temperature
Ahtanum Creek (S.F.)	None	None	None	Temperature
Toppenish Creek	None	None	None	None
Satus Creek	Not in Database	Not in Database	Not in Database	Not in Database

Source: Ecology, 2008

Several streams within the Wenatchee National Forest were included on Washington's 303(d) list for temperature (Table 3-6). In 2001, the U.S. Forest Service (USFS) conducted an expanded monitoring effort to evaluate stream temperatures throughout the Wenatchee National Forest including the upper Yakima and Naches River basins. During the 2001 study, temperatures of greater than 16° C, the applicable temperature criterion at the time, were measured in several streams including Taneum Creek, North Fork Taneum Creek, Bumping River, and South Fork Tieton River (Whiley and Cleland, 2003).

Evaluation of the relationship between the diurnal range and the maximum water temperature on August 12, 2001, the day when most sites had their maximum temperature in that year, indicated that there were data outliers (i.e., warm-water and cold-water stations). Many of the warm-water stations, including stations on the Cle Elum River and lower Bumping River, have a significant amount of water storage in the form of natural lakes or impoundments that contribute to flow passing the monitoring locations (Whiley and Cleland, 2003).

Stream temperature data collected in the Teanaway River basin during the early 1990s showed numerous excursions above the state numeric temperature criteria, resulting in eight stream segments in the Teanaway basin being included on Washington State's 1996 and 1998 303(d) lists of impaired waterbodies (Irle, 2001). In the summer of 1998, Ecology and the USFS collected hourly stream temperatures throughout the Teanaway basin at 10 locations. Monitoring results show that except for the highest altitude site, all measured sites exceeded the state numeric temperature criteria applicable at that time. Maximum temperatures of greater than 20° C were reported for the lower North Fork, upper and lower Middle Fork, and the mainstem where the maximum reached 28.5° C (Irle, 2001).

Development of a temperature Total Maximum Daily Load (TMDL) in 2003 resulted in removal of the basin's streams from the 303(d) list (Table 3-6). A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. The TMDL includes goals to reduce the pollutant levels.

3.6.2.2 Naches River Basin Tributaries

Several streams in the Naches River basin are included on the 303(d) list for high temperatures (Table 3-6) (Ecology, 2008). For most of these sites, Ecology (2005c) identified forest practices, agriculture, riparian modification, and grazing as contributing nonpoint sources. In addition, industrial point sources were identified as contributors for four Cowiche Creek basin 303(d) temperature listings. Cowiche Creek also has been included on the 303(d) list for six other parameters, although the 303(d) listing for instream flow was not included on the 2004 list and is not proposed for the 2008 list. Generally, the water quality of the Bumping River is very good (WSDOT and FHA, 2005).

3.6.2.3 Middle and Lower Yakima River Tributaries

Ahtanum Creek and its North and South Forks are all proposed to be included on the 303(d) list due to high temperature. Although neither Toppenish nor Satus Creeks are included on the 303(d) lists, temperatures have exceeded 20° C in both of these creeks. In lower Toppenish, Simcoe, and Agency Creeks, high water temperatures have resulted from diversion of annual spring flooding, draining of wetlands, riparian degradation, and the large volume of warm irrigation returns routed from the Wapato Irrigation Project (WIP) down Simcoe and Toppenish Creeks (YBFWRB, 2008). Stream temperatures increase with proximity to the mouth of Toppenish Creek, with the highest weekly average temperature among four stations in 2004 approaching 24° C at a point 10 miles upstream from the mouth. Data from the summer of 2007 indicate some cooling below RM 10 may be related to ground water upwelling. Temperatures in Marion Drain are moderated (about 6° C cooler in the summer and 5° C warmer in the winter than the mainstem) because of the drain intercepting ground water. The ground water is presumed to have flowed into nearby Toppenish Creek before the drain was constructed (YBFWRB, 2008).

Most of the Satus Creek watershed is undeveloped and is not exposed to agricultural, industrial, or domestic effluents. However, maximum weekly average temperatures can exceed 26° C in the reach of Satus Creek between Logy Creek and Wilson Charley Creek (RM 39.3) because of riparian impacts and low flow. Logy Creek may cool Satus Creek for a few miles downstream from their confluence (YBFWRB, 2008). Although water quantity increases as Satus Creek flows through the WIP in its lowermost 8 miles, water quality suffers in this reach (YBFWRB, 2008).

3.7 Hydropower

Hydropower is generated within the Yakima Project at Roza Power Plant and Chandler Power Plant. All hydropower generation at Chandler Power Plant is marketed by the Bonneville Power Administration (BPA). The hydropower generation at Roza Power Plant is primarily used to supply power to pumps for irrigation water delivery to Roza Irrigation District (Roza) water users. When the power generated by Roza Power Plant is in excess to the Roza power demand, the excess power is marketed through BPA under the Federal Columbia River Power System (FCRPS). During the irrigation season, when Roza's demand for power exceeds the power supply available from Roza Power Plant, the district receives additional power from BPA. This annual exchange of power is accomplished through an agreement between Reclamation and BPA (Reclamation, 2002).

Hydropower is further discussed in Sections 4.4.1 and 5.4.1 of the January 2008 Draft Planning Report/EIS.

3.8 Vegetation and Wildlife

The following discussion focuses on the areas where vegetation and wildlife would be directly impacted or where changes to vegetation communities and wildlife species over time are anticipated. The affected area includes the five existing reservoirs where fish passage facilities would be constructed and the area of the Bumping Lake expansion. Proposed flow increases in the mainstem and tributary streams may also result in alteration or creation of riparian plant communities over time, so these areas are described below. However, the modification of existing structures and operations to increase instream flows is not anticipated to affect vegetation or wildlife species as the areas of construction are already disturbed.

The January 2008 Draft Planning Report/EIS Sections 4.7 and 5.7 (Reclamation and Ecology, 2008) addressed much of the Yakima River basin. However, some vegetation communities, wildlife, and listed species present at each reservoir and along the tributaries proposed for enhancement projects were not addressed and will be discussed in the following sections. The 2004 Yakima Subbasin Plan (YSPB, 2004) contains comprehensive descriptions of plants and wildlife in the basin as well as federal and state listed species. Lists of priority habitats and species records in the vicinity of the proposed action areas are presented in Appendix B of this document.

3.8.1.1 Upper Yakima River Basin

The Yakima River originates at the Keechelus Dam at 2,450 feet, which is within the Ponderosa pine (*Pinus ponderosa)* community zone (Franklin and Dyrness, 1988). This zone currently extends from the headwaters to the confluence with the Teanaway River. Mixed conifer stands occur in the vicinity of Cle Elum, Keechelus, and Kachess Lakes. Habitat is characterized by Douglas fir (*Pseudotsuga menziesii),* grand fir (*Abies grandis*), and young Ponderosa pine with an understory of bitterbrush (*Purshia tridentata*) and kinnikinnick (*Arctostaphylos uva-ursi*). Lodgepole pine (*Pinus contorta*) is also present as well as black cottonwood (*Populus balsamifera*) along downstream rivers. Conifer forests are used by elk and deer, small mammals, raptors, owls, grouse and a wide range of songbird species. Washington Department of Fish and Wildlife (WDFW) priority species in the upper basin include fisher, northern goshawk, and pileated woodpecker (WDFW, 2008) (see Appendix B).

Near the confluence of the Teanaway River, vegetation communities transition toward agricultural areas and grasslands. Riparian areas are associated with backwaters, sloughs, and oxbows as well as the main river channel. Vegetation is dominated by black cottonwood, red alder (*Alnus rubra*), Pacific willow (*Salix lucida spp. lasiandra*) and red-osier dogwood (*Cornus stolonifera*). Riparian habitats along the mainstem of the Yakima River are highly productive and used by a diverse number of wildlife species.

Approximately 85 percent of Washington's terrestrial vertebrate species use riparian habitat for essential life activities and the density of wildlife in riparian areas is comparatively high (Knutson and Naef, 1997). Riparian areas are used by deer, elk, heron, waterfowl, and many amphibian species and cavity-nesting birds. Good riparian habitat is generally found along some forested headwater reaches, whereas degraded riparian habitat is concentrated in the valleys and frequently associated with agriculture, grazing, and fluctuating, regulated stream flow.

Wetlands in the basin are located along the mainstem of the Yakima River and especially in the Kittitas Valley. In the upper basin, wetlands are found along smaller tributaries, at seeps and springs, at high-elevation wet meadows, and along the shorelines of natural lakes. Many wetlands are designated as WDFW priority habitats, as well as open water areas that support high concentrations of waterfowl (WDFW, 2008) (see Appendix B).

3.8.1.2 Lower Yakima River Basin

Shrub-steppe habitat historically dominated the Yakima River basin from approximately Ellensburg to Pasco. However, large-scale conversion to cropland and rangeland has altered native habitats. Wetlands and the sagebrush-steppe (*Artemsia spp*.) community zone and associated wildlife are covered in detail in the January 2008 Draft Planning Report/EIS and will not be further addressed here.

Riparian areas in the lower basin are dominated by black cottonwood, willow, silver maple (*Acer saccharium*), mulberry (*Morus alba*), and hackberry (*Celtis laevigata*). Wildlife in these habitats includes deer, bats, raptors, owls, herons, waterfowl, pheasant, quail, and many songbird species. Unlined canals and drains provide habitat (nesting, brood rearing, feeding and thermal escape and cover) for upland game, waterfowl, furbearers, and many songbird species (Yakama Nation, 1992). Priority species in the lower basin include bald eagle, western grebe, and sage grouse (WDFW, 2008) (see Appendix B).

3.8.1.3 Naches River Basin

The Naches River begins near Naches Pass at 5,860 feet elevation. The mainstem of the Naches River upstream of the Bumping River confluence is known as the Little Naches River. The river flows 75 miles through mixed conifer forest and irrigated agricultural land until its confluence with the Yakima River northwest of Yakima. The large drop in elevation between the headwaters and the confluence (approximately 4,700 feet) results in a significant change of vegetation communities, from alpine habitats to arid lower valleys. Conifer forests are dominated by Douglas-fir, western red cedar (*Thuja plicata*), western white pine (*Pinus monticola*), Ponderosa pine, and western hemlock (*Tsuga heterophylla*). Wildlife species that occur in the basin include those found in the adjacent Yakima River basin, but also include black bear, mountain goat, cougar, and bobcat. Small mammals include several squirrel and chipmunk species. Riparian areas in the lower basin are dominated by scrub-shrub vegetation such as sugar maple, young black cottonwood, wild rose (*Rosa* spp), willow, and alder. Wildlife species that use this habitat are deer, coyote, rabbit, small rodents, raptor, owls, waterfowl, and a variety of small reptiles and songbirds. WDFW priority species include fisher, northern goshawk, and pileated woodpecker (WDFW, 2008) (see Appendix B).

According to the Limiting Factors Inventory, riparian forests along the Naches River have undergone a significant decline as a result of direct removal for construction of dikes and roads from the mouth to the confluence of the Tieton River (WSCC, 2001). Direct removal of forest along the Naches River has been a significant mechanism of loss of floodplain. The loss is estimated at over 57 percent. Additionally, changes in flow regime coupled with floodplain constriction appear to have decreased recruitment of cottonwood trees (the keystone riparian tree in the lower Naches River basin) and may be impacting the health of existing trees. With existing mature forest size reduced and recruitment of younger trees declining, forest size and health along the lower Naches River are continuing to decline (GeoEngineers, 2003).

Bumping Lake

Bumping Lake lies at 3,400 feet elevation and is surrounded by mixed conifer forest characterized by Douglas-fir, western larch (*Larix occidentalis*), lodgepole pine, western white pine, black cottonwood, grand fir, western red cedar, and Engelmann spruce (*Picea engelmannii*) (Reclamation, 2008a). The shrub layer includes red-osier dogwood, red alpine blueberry (*Vaccinium scoparium*), wild rose, Oregon grape (*Mahonia nervosa*), mountain alder (*Alnus viridis*), Douglas maple (*Acer glabrum* var *douglasii*), kinnikinnick, and snowberry (*Symphoricarpos albus*). Herb species include bunchberry (*Cornus canadensis*), twinflower (*Linnaea borealis*), pipsissewa (*Chimaphila maculata*), vanilla leaf (*Achlys triphyilla*), and strawberry *(Fragaria* spp.). In forest openings and meadows, sedges (*Carex spp*.) and rushes (*Juncus spp*.) are present.

The area supports a variety of terrestrial mammals including elk and deer, though winter use is marginal due to snow depths (Reclamation, 2008a). Mountain goats occur on American Ridge, adjacent to Bumping Lake, and on Nelson Ridge to the south. Aquatic mammals include beaver, river otter, muskrat, and mink. Small mammals likely include snowshoe hare, northern flying squirrel, golden-mantled ground squirrel, Douglas squirrel, yellow-bellied marmot, and yellow pine chipmunk.

A variety of reptiles and amphibians are present as well as raptors, owls, waterfowl, and many songbird species. Osprey tend to nest along the lakeshore. Principal waterfowl species nesting in lake-fringe habitats include mallard and green-wing teal, and cavity-nesting ducks that may occur in the area include wood duck and Barrow's goldeneye. Amphibian species include Cascades frog, Pacific tree frog, western toad, northern long-toed salamander, and western skink. Reptile species include northern alligator lizard, rubber boa, and garter snake.

Priority species in the vicinity of Bumping Lake include lynx, wolverine (*Gulo gulo*), western toad (*Bufo boreas*), northern goshawk, common loon (*Gavia immer*) (WDFW, 2008) (see Appendix B). Bumping Lake and the surrounding forests to the south and northeast are within spotted owl Critical Habitat Unit (CHU) Number 6: Southeast Washington Cascades (USFWS, 2008).

Rimrock Lake

Rimrock Lake is surrounded by conifer forest similar in character to those adjacent to Bumping Lake. Dominant trees include Ponderosa and lodgepole pine, western white pine, and Douglas-fir. Understory vegetation consists of small shrubs, such as snowberry and vine maple, and perennial grasses. Narrow riparian areas are present along the Tieton River that are dominated by black cottonwood, quaking aspen (*Populus tremuloides*), water birch (*Betula occidentalis*), mountain alder, and red-osier dogwood. Wildlife species in the area are the same as those described previously for Bumping Lake. Priority species in the vicinity of Rimrock Lake include gray wolf, marten and pileated woodpecker (WDFW, 2008) (see Appendix B).

3.8.1.4 Yakima River Tributaries

Riparian habitat along many tributaries in the Yakima River basin is currently degraded due to flow diversions and excessive livestock grazing. Overhanging vegetation and large woody debris have also been removed to improve flows, eliminating many miles of channels and creeks for use by nesting waterfowl. Although current land use practices limit riparian habitat development, the remaining vegetation provides nesting cover for many species of waterfowl and songbirds. Waterfowl use the canals and drains of irrigation facilities and areas of undisturbed wetland habitat. Spring burning of canal banks is generally followed by herbicide applications through the summer (Reclamation, 2002). Late spring burning has decreased active waterfowl and pheasant nesting (Oakerman, 1979; Oliver, 1983).

Wetlands are common along Toppenish and Satus Creeks due to their low gradient and braided channels. As in other Yakima River basin areas, most emergent wetland habitat along these streams has been removed through draining and land leveling; however, the

Yakama Nation has undertaken extensive wetland restoration efforts in the area. Remaining areas are heavily grazed during spring and summer months, decreasing wildlife habitat. However, flooded areas are heavily used by migratory waterfowl such as Canada geese. Refuges along Toppenish Creek provide important habitat for migratory and wintering waterfowl. See Appendix B for information about priority species use of habitats in the tributaries.

3.8.1.5 Naches River Tributaries

Vegetation along the Bumping River is characterized by intact and mature mixed conifer forest. Dominant species include Douglas-fir, western red cedar, Ponderosa pine, and black cottonwood, with alder and willow present near the banks. Scrub-shrub and forested wetlands are present on the south side of the river near Goose Prairie and Soda Springs and near the confluence with the Naches River. Wildlife species described previously are likely to use riparian habitats as well as several bird species, common merganser, harlequin duck, and American dipper.

The Tieton River flows from the dam at Rimrock Lake through mature forest dominated by Ponderosa pine before entering a columnar basalt canyon. Riparian vegetation includes black cottonwood, quaking aspen, willow, and dogwood. Oak woodlands dominated by Oregon white oak (*Quercus garryana*) also occur in the corridor. Wildlife species include elk, bighorn sheep, mule deer, black bear, and cougar. Golden eagles are known to use cliffs for nesting and spotted owls occupy adjacent conifer forest. Multiple woodpecker species are also present, including white-headed, Lewis' and acorn, which are uncommon across much of the state. Several priority species occur in the Tieton River drainage, including Western gray squirrel, peregrine falcon, white-headed and Lewis's woodpeckers (WDFW, 2008) (see Appendix B).

3.8.1.6 Listed Species

The Yakima River basin contains 67 rare plants and 52 rare or high-quality plant communities. Approximately 8 percent of the rare plant communities are associated with grassland habitat, 28 percent with shrub-steppe habitat, 56 percent with upland forest habitat, and 8 percent with riparian habitat. The Yakima Subbasin Plan (YSRB, 2004) contains a detailed list of known rare plant occurrences and rare plant communities in the basin. In terms of wildlife, there are 26 bird species, 16 mammal species, 11 amphibian species, and 5 reptile species listed by federal and/or state agencies. The Yakima Subbasin Plan (2004) contains a complete list of species status as well as game species. Appendix B of this document presents information received from WDFW of priority habitats and species in the vicinity of the proposed construction areas, existing reservoirs, and tributaries.

3.9 Fish and Aquatic Resources

3.9.1 Anadromous Fish

3.9.1.1 Extent of Affected Area

The affected area includes the mainstem Yakima, Cle Elum, Naches, and Tieton Rivers and the reservoirs of Cle Elum, Bumping Lake, Tieton (including Clear Lake), Keechelus, and Kachess Dams. Also included is the tributary habitat upstream and downstream of each reservoir to the confluence of the Yakima River, as well as tributary habitat of the North Fork Tieton River upstream of Clear Lake Dam and downstream to the confluence of the North Fork Tieton River with Rimrock Lake. In addition, other tributaries to the Yakima mainstem are included as follows: Big Creek, the Teanaway River, Swauk Creek, Taneum Creek, Manastash Creek, Wilson Creek, Naneum Creek, Ahtanum Creek, Toppenish Creek, and Satus Creek. Cowiche Creek, a tributary to the Naches River, is also included.

The January 2008 Draft Planning Report/EIS Section 4.8 (Reclamation and Ecology, 2008) addressed many of the above areas. However, tributary habitat above the reservoirs as well as the Yakima and Naches tributaries listed above were not addressed, and they are discussed in the following sections.

3.9.1.2 Distribution of Steelhead and Salmon

Anadromous steelhead and salmon were historically widespread in the Yakima, Naches, and Tieton drainages. The historical distribution of fish in these watersheds was discussed in the January 2008 Draft Planning Report/EIS Section 4.8.1.2 (Reclamation and Ecology, 2008). Currently, no anadromous steelhead or salmon exist in the tributary habitat upstream from Reclamation's reservoirs due to passage barriers. However, resident bull trout are present above all of Reclamation's dams. Salmon and steelhead are present in the other tributaries up to the point of barriers, either natural or man-made. The upstream extent of anadromous salmonids is provided in Table C-1 in Appendix C.

Dams constructed at the outlet to Keechelus Lake on the upper Yakima River and on the Kachess and Cle Elum Rivers are barriers to upstream fish passage and represent the upper extent of anadromy for salmonids on these tributaries. On the Cle Elum River, there is also a natural falls in the vicinity of the China Point area that serves as a natural, partial barrier to upstream fish passage at certain flows for this tributary.

Manastash and Naneum Creeks both contain man-made fish passage barriers relatively close to their confluences with the Yakima River. Man-made barriers close to the Yakima River confluences for Big and Taneum Creeks have been modified to allow passage. The man-made barrier on Big Creek now provides full passage for adult and juvenile salmonids. The structures on Taneum Creek have been modified to allow partial fish passage, with work underway to provide year-round passage for both adult and juvenile salmonids.

Man-made barriers at facilities on Toppenish and Ahtanum Creeks do not have fish passage facilities and offer only partial passage up to natural barriers in the headwaters of these streams. The barriers on Toppenish and Ahtanum Creeks are located further upstream than the facilities on Big and Taneum Creeks. Although Cowiche Creek does not contain man-made passage barriers, there are at least two natural obstacles to fish passage at certain flows. However, fish can enter Cowiche Creek from the Naches River via an irrigation ditch to avoid these natural obstacles. Appendix C, Table C-1 provides additional details for these barriers.

Naches River tributaries include the American, Bumping and Tieton Rivers. Dams on Bumping and Tieton Rivers act as man-made barriers to upstream salmonid passage. Bumping River also contains an upstream natural barrier.

3.9.1.3 Anadromous Fish Status

The status of anadromous fish populations in the Yakima, Naches, and Tieton River drainages was discussed in the January 2008 Draft Planning Report/EIS Section 4.8.1.2 and is summarized here. Anadromous salmonid fish currently using the Yakima basin include the Mid Columbia River Evolutionarily Significant Unit (ESU) steelhead (federally listed as threatened), spring and fall Chinook, and coho (reintroduced). Bull trout (federally listed as threatened) are discussed in Section 3.9.2 (Resident Fish). There is only one non-salmonid anadromous fish species currently using the Yakima basin—the Pacific lamprey, which is a federal species of concern.

Steelhead – Steelhead are found in the whole basin, which includes the Satus, Toppenish, Naches, upper Yakima, and Ahtanum watersheds (YBFWRB, 2008). Steelhead enter the Yakima River in greatest numbers in September through November and then again in February through April (Haring, 2001). Steelhead hold in the mainstem until moving into tributaries throughout the basin to spawn. Adults spawn February through June, mostly in tributaries, and fry emerge from the gravel from May into July. They spend from 1 to 3 years in fresh water before beginning to migrate to the ocean in spring.

Over the 10-year period from 1997 to 2006, steelhead basin-wide escapement has averaged 2,339 fish, ranging from 1,070 in 1998-1999 to 4,525 in 2001-2002 (Reclamation and Ecology, 2008). The run is dominated by wild fish. The run also contains a hatchery component of 8 percent over the period of record and 3 percent between 1999 and 2007 (YBFWRB, 2008). The hatchery component is attributed to strays returning from outside the basin (WDFW, 2009).

Spring Chinook – The upper Yakima, Naches River basin, and American River spawning groups comprise the Yakima River basin spring Chinook population. About 60 to 70 percent of the population returns to the upper Yakima River (Keechelus Dam to Ellensburg) and Cle Elum River annually. Adult spring Chinook return to the Yakima River beginning in late April through June, and spawning occurs from August to September. Juveniles migrate downstream from the time of emergence through summer and fall. After spending 1 year in fresh water, spring Chinook begin their seaward migration, with the majority passing Prosser Diversion Dam (RM 47) in April. Returning adults spend from 1 to 3 years in the ocean before returning to spawn.

Over the 10-year period from 1997 to 2006, spring Chinook basin-wide escapement averaged 10,264 fish, ranging from 1,903 in 1998 to 23,265 in 2001 (Reclamation and Ecology, 2008).

Fall Chinook – Fall Chinook inhabit approximately 100 miles of the lower Yakima River from Sunnyside Dam to the Columbia River confluence. In some years, fall Chinook have been documented spawning in the reach between Union Gap and Selah and in the lower Naches River downstream of the City of Naches. The Yakama Nation has been acclimating and releasing fall Chinook into the Naches River at Gleed for several years. The Yakama Nation and WDFW plan to transition the releases upstream of Union Gap from fall to summer Chinook salmon as part of their plans to reintroduce extirpated summer Chinook to the middle Yakima River and lower Naches River. There is also a self-sustaining fall Chinook population in Marion Drain. Typically, the mainstem Yakima spawning run begins in early September, peaks in late September, and concludes by the second week of November. Typical emergence timing for Yakima River fish occurs from late March through May. Marion Drain fish spawn at the same time as Yakima River fish, but because of warmer water temperatures, they emerge in mid-February to late March.

Over the 10-year period from 1997 to 2006, fall Chinook basin-wide escapement averaged 2,830 fish, ranging from 1,120 in 1997 to 6,241 in 2002 (Reclamation and Ecology, 2008). It is estimated that the Prosser count represents approximately 30 to 40 percent of the total count, since the majority of spawning occurs downstream of Prosser Dam (Hubble, personal communication, 2008). Marion Drain escapement fell sharply after 1988 (Haring, 2001) and remains relatively low.

Coho – Although endemic coho were extirpated (became locally extinct) from the Yakima River basin in the early 1980s, natural reproduction of hatchery-reared coho is now occurring in both the Yakima and Naches Rivers. The Yakama Nation has released between 85,000 and 1.4 million coho smolts in the Yakima basin annually since 1985 (Haring, 2001).

The majority of coho spawning and rearing occurs in the upper Wapato reach below Parker Dam, in the lower Naches River between Cowiche Dam and the City of Naches, and in the upper Yakima River in the vicinity of Ellensburg. Spawning has also been documented in several tributaries (e.g., Ahtanum, Tanuem, lower Satus, Cowiche, and Nile Creeks) as the Yakama Nation expands its supplementation program into historic areas.

Over the 10-year period from 1997 to 2006, coho basin-wide escapement averaged 3,438 fish, ranging from 818 in 2002 to 6,216 in 2000 (Reclamation and Ecology, 2008). It is estimated that the Prosser count represents approximately 30 to 40 percent of the total count, since the majority of spawning occurs downstream of Prosser Dam (Hubble, personal communication, 2008).

Sockeye – The four natural glacial lakes in the Yakima River basin historically supported sockeye salmon. The construction of crib dams at the outlet of the lakes contributed to the extirpated of the species from the basin in the early 1900s.

Pacific Lamprey – In eastern Washington, Pacific lamprey historically occurred in the Yakima River basin and in numerous other Columbia River basins, including the Spokane

River and Asotin Creek (Wydoski and Whitney, 1979). Current knowledge of Pacific lamprey in the Yakima River basin is limited to incidental observations of approximately five adults annually at the Prosser adult fish passage facility since 1985 (Johnston, 2009). The Yakama Nation is conducting studies of lamprey in the basin and the potential for providing passage for lamprey at existing dams. Data from Columbia River dams suggest that, although annual numbers fluctuate widely, there is a decreasing trend in the number of adult Pacific lampreys counted at each project (U.S. Federal Register, 2004). Data indicate that large declines occurred during the late 1960s and 1970s, and that current counts continue to be well below historical levels (Close et al., 1995; BioAnalysts, Inc. 2000).

3.9.1.4 Habitat Conditions for Anadromous Fish

Anadromous fish require certain habitat conditions, as discussed in the January 2008 Draft Planning Report/EIS Section 4.8.1.3. Flows, hydrology, sediment, large woody debris (LWD), and channel condition all affect salmonid growth and survival. Tables C-2 through C-4, in Appendix C, summarize these conditions for each of the streams in the affected area. Because anadromous fish do not use the reservoirs or their upstream tributaries due to passage barriers, conditions for above-reservoir habitat are addressed in light of habitat that would be used if anadromous fish were present.

The following sections summarize stream information provided in Tables C-5 through C-6, located in Appendix C. Streams are divided into two groups. **Above-reservoir tributaries** include the areas above Cle Elum, Keechelus, Kachess, Bumping, and Tieton Dams, including the area upstream of Clear Lake Dam. The second group includes the following **Yakima River tributaries**: Big Creek, the Teanaway River, Swauk Creek, Taneum Creek, Manastash Creek, Wilson/Naneum Creek, Jack Creek, Indian Creek, Ahtanum Creek, Toppenish Creek, and Satus Creek. Cowiche Creek and the Little Naches River, tributaries to the Naches River, are also included in this group.

Flow Conditions

Flow conditions above the reservoirs typically remain unaltered with unregulated flow regimes, notwithstanding effects on flow from forest practices, roads, grazing, fire, and other land use influences. Flow variability is retained due to geographic surroundings and persistent flow contributions from springs and smaller drainages. Streams that recently have experienced flow alterations include Gold Creek, which drains to Keechelus Lake, and tributaries to the Kachess River, which become dewatered due to low flows or go subsurface as reservoirs are drawn down (Haring, 2001). Land use practices may be responsible for the flow alterations at Gold Creek; however, those alternations have not been quantified.

Yakima River tributaries frequently experience low flow in downstream portions as a result of irrigation withdrawals during the late summer and early fall. These flow conditions often preclude salmonids from occupying stream habitat, as do impassable barriers. When diversions for irrigation do not exist, flow conditions tend to remain adequate for fish. However, low precipitation can result in natural low-flow conditions and dry stream channels during the summer and fall.

Several streams do not typically experience low-flow conditions. Wilson Creek, which is fed by several tributaries including Naneum Creek, provides year-round flow in the lower reaches despite upstream irrigation withdrawal. Downstream irrigation return flows are largely responsible for these flow conditions (KCCD, 1999). Ahtanum and Cowiche Creeks typically have good flows during the spring, but occasionally experience low flow or variable summer flow due to diversions (Ecology, 2005a; CBSP, 1990). For Ahtanum Creek, the most significant flow reductions occur in these seasons, but the Ahtanum Irrigation Diversion (AID) diverts water year-round and flows are also reduced somewhat in winter.

Sediment Conditions

Sedimentation is a problem in several streams above the reservoirs, mostly as a result of human activities such as off-road vehicle use or road maintenance (USFS, 1997). In some cases, natural slide events contribute significant quantities of sediment to these streams.

Sedimentation is also problematic for Yakima River tributaries. Notable exceptions to this include Big Creek and the Teanaway River (KCCD, 1999). Sedimentation is uncommon in the North Fork of the Teanaway River, and the Middle and West Forks have excellent spawning gravels.

Human induced and natural sources of sediment inhibit spawning activity in several Yakima River tributaries. Ground disturbances such as mining, road maintenance, forest practices, and grazing contribute substantial quantities of fine sediments (fines). Erosion from bank disturbance and bank cutting also contribute fine sediments that embed gravels and reduce spawning habitat quality. Fine sediment fills the spaces between gravels, which reduces the flow of oxygenated water around incubating or fertilized eggs. This results in reduced survival from egg to fry.

Fine sediments are present throughout much of the upper watersheds of these tributaries. Road building and logging activities are the primary sources of sediment high in the watershed. Conditions often worsen lower in the watershed as development, urban runoff, and irrigation supply additional sediment to the tributaries. In Ahtanum Creek, the greatest threat to fish production is bank erosion in the lower gradient, downstream portions of the stream (Ecology, 2005a; CBSP, 1990). In other streams, low-flow conditions resulting from irrigation withdrawals or reservoir-induced slowing of flow allow fine sediments to settle.

Large Woody Debris Conditions

Large woody debris (LWD) is abundant in the upper portions of the Cle Elum, Tieton, and Bumping River systems. Upper stream segments serve as the main source of instream LWD for these river systems, the material moving downstream during high flow events, settling in low-gradient, unconfined channel reaches. However, in streams where intensive timber harvest adjacent to streams has removed LWD sources, LWD is generally lacking in the system. Generally, when forest practices are common in the upper watershed, LWD is lacking in the streams (USFS, 1998). LWD recruitment to lower stream reaches is also interrupted by reservoirs where LWD washes up on the shores or becomes waterlogged and sinks.

In many Yakima River tributaries, LWD that enters the lower reaches is actively removed to avoid damaging or disrupting irrigation diversion and delivery systems. When LWD is sparse, habitat complexity is reduced and problems related to channel stability and bed scour become more frequent.

Upper Toppenish Creek contains abundant quantities of LWD due to its largely unaltered condition. However, further downstream sources of LWD do not exist and LWD becomes less frequent. Big Creek and Cowiche Creek experience similar LWD conditions as Toppenish Creek. In Cowiche Creek, LWD is sparse in the lower portions of the stream because naturally confined canyons or low-gradient floodplains remove LWD from the system. Satus Creek contains little downstream LWD due to floodwater transport of LWD out of the channel to the floodplain.

Channel Conditions

Channel conditions vary significantly within a particular stream and between streams. The Bumping and Tieton Rivers upstream of the reservoirs generally exhibit excellent habitat conditions due to basically unaltered channels. The Cle Elum River contains many excellent habitats, but some reaches of the stream contain low pool volume and reduced habitat complexity. The substrate of the Kachess River is considered stable (USFS, 1995a), but in-channel pool frequency and complexity are lacking.

The upper portions of the Teanaway River, Manastash Creek, and Cowiche Creek above the agricultural zone generally exhibit good stream channel conditions with high-quality gravels and gradients for salmonid spawning and rearing. These areas also have excellent riparian corridors and cover, particularly the reaches within public or private forest lands; however, local impacts are present (CBSP, 1990). Some stream reaches have poor riparian cover (Plum Creek, 1996). Lower in the watershed, streams are low gradient with confined reaches.

Taneum Creek and Toppenish Creek contain fair to good quality habitat with abundant LWD and boulders, particularly in the upper portions of the streams. However, in the lower reaches, habitat quality is degraded by: low pool frequency due to a lack of instream wood; sparse riparian vegetation due to clearing for road construction, overgrazing in riparian habitat, and farming activities; and poor water quality due to diversions for irrigation and wastewater returns that reduce flows and contribute to increased instream temperatures and decreased dissolved oxygen.

Other streams exhibit low-quality channel habitat. Mining or dredging has removed LWD and boulders, resulting in a loss of structural complexity and an increase in channel incision, in addition to alterations in the natural substrate. Straight and incised stream channels allow high-velocity flow conditions that remove LWD and riparian vegetation, leading to bank erosion. Confined channels lack connections with side channels and floodplains. These streams exhibit low habitat complexity, particularly in the lower reaches.

Habitat Alterations

Habitat in the affected area has been significantly altered from historic conditions. Alterations in the affected area range from fish passage barriers caused by water diversions and culverts, to logging, wetland disturbance, and other development in the watershed.

There are no constructed barriers above the reservoirs. However, degraded channel conditions have resulted from the slowing of flow as streams approach the dams, the loss of LWD, and the reduction of riparian vegetation in the upper watersheds. With dam construction, small tributaries became inundated, eliminating meandering channels and habitat complexity. In Coal Creek, which drains to Keechelus Lake, the construction of I-90 caused confinement of the channel. Other stream alterations stem from logging practices and an associated reduction in canopy cover along the stream corridor. Exceptions include the Bumping and Tieton Rivers, which have remained largely unaltered.

Constructed barriers are not common in these streams, but irrigation diversions are one of the most widespread alterations to these systems. In many cases, diversions are associated with low-flow conditions, stream channelization, and sedimentation. Low flows cause reduced fish passage, while sedimentation and channelization negatively impact spawning success. Other sources of sedimentation include grazing, and in the lower stream reaches, development for residential and recreational activities. Development has reduced the floodplain, resulting in flashy flow conditions. A degraded riparian corridor caused by human activities facilitates further erosion. In the upper watershed, road construction associated with timber harvest leads to increased sedimentation.

Big Creek, Ahtanum Creek, and Toppenish Creek all contain water diversions, some of which have constructed barriers, such as perched culverts, that are obstacles to fish passage. Channelization and entrenchment resulting from irrigation diversions and the removal of LWD are also problematic stream modifications. Low-flow conditions and limited riparian corridors often lead to sedimentation and fish passage problems. These conditions are exemplified by Naneum and Wilson Creeks, which have been diked, channelized, and rerouted for irrigation and contain sparse riparian vegetation.

3.9.2 Resident Fish

3.9.2.1 Extent of Affected Area

The affected environment for resident fish is the same as described for anadromous fish in Section 3.9.1 of this document.

3.9.2.2 Description and Distribution

Resident fish populations were described in Section 4.9 of the January 2008 Draft Planning Report/EIS (Reclamation and Ecology, 2008). Resident native salmonids in the Yakima River basin include the Columbia River Distinct Population Segment (DPS) bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*Oncorhynchus clarki lewisi*), rainbow trout (*Oncorhynchus mykiss*), kokanee (*Oncorhynchus nerka*), mountain whitefish (*Prosopium williamsoni*), and pygmy whitefish (*Prosopium coulteri*) (Pearsons et al., 1998;

WDFW, 1998). Eastern brook trout (*Salvelinus fontinalis*), a nonnative (introduced) salmonid, is also present. Of these species, those of special concern include bull trout (federally threatened) and pygmy whitefish (state sensitive).

Thirty-seven resident nonsalmonid species are present in the Yakima River basin (Pearsons et al., 1998). The most abundant of these in the upper Yakima River basin are speckled dace *(Rhinichthys osculus*), longnose dace (*Rhinichthys cataractae*), redside shiners (*Richardsonius balteaus*), northern pikeminnow (*Ptychocheilus oregonensis*), largescale suckers (*Catostomus macrocheilus*), bridgelip suckers (*Catostomus columbianu*s), and sculpins (*Cottus sp*.). Burbot (*Lota lota*) is present in Keechelus, Kachess, and Cle Elum Lakes (Bonar et al., 2000). Another less abundant species of special concern is the mountain sucker (*Catostomus platyrhynchus*) (state candidate). For a complete fish species list for the Yakima River basin, refer to Pearsons et al. (1998).

Bull trout were addressed in the January 2008 Draft Planning Report/EIS Sections 4.9.1.2 and 4.11.1.2 as resident fish due to their resident, fluvial, and adfluvial life histories in the Yakima River basin affected area (Reclamation and Ecology, 2008). Because bull trout in the affected area are listed as threatened under the Endangered Species Act and may be a target of salmonid habitat enhancement projects being considered in this EIS, a summary of bull trout information is included here.

Three bull trout life history forms are present in the Yakima River basin: adfluvial, fluvial, and resident. Adfluvial (lake-rearing) stocks occur in the Rimrock, Bumping, Kachess, and Keechelus reservoirs (Haring, 2001; WDFW, 1998). Fluvial (river-rearing) bull trout are present in the mainstem Naches and Yakima Rivers, migrating out of these rivers into spawning tributaries in the late summer to spawn in September and early October. A resident stock occurs in the upper Ahtanum basin (North, South, and Middle Forks of Ahtanum Creek), but does not often enter the mainstem of Ahtanum Creek. Fluvial/resident forms are present in the Naches River drainage and in the North Fork Teanaway drainage (Haring, 2001; WDFW, 1998). Adfluvial bull trout enter reservoir tributaries early in summer, to hold and eventually to spawn in the fall. Fluvial bull trout move throughout river systems and spawn in tributaries in the summer. The lack of upstream/downstream fish passage facilities at the reservoirs prevents adfluvial fish from interbreeding with downstream fluvial populations.

The WDFW Salmon and Steelhead Stock Inventory (SASSI) program characterizes bull trout stocks in the Yakima River basin. Stocks upstream of Rimrock Lake are characterized as healthy; Bumping Lake bull trout stock are characterized as depressed; Yakima River, Ahtanum Creek, North Fork Teanaway, Kachess Lake, and Keechelus Lake stocks are characterized as critical; and Cle Elum Lake bull trout stocks are characterized as unknown (WDFW, 1998). Bull trout in the Naches River fluvial group are characterized as depressed in Rattlesnake Creek and in the American River, and critical in Crow Creek (WDFW, 1998). There are only a few historical catch records that indicate the presence of bull trout in Yakima River tributaries; relatively few fish were noted in these records (Haring, 2001).

3.9.2.3 Habitat Conditions for Resident Fish

Habitat conditions for resident fish in the affected area are the same as those discussed for anadromous fish in Section 3.9.1 of this document.

3.9.3 Aquatic Invertebrates

3.9.3.1 Extent of Affected Area

The affected environment for aquatic invertebrates is the same as described for anadromous fish in Section 3.9.1 of this document.

3.9.3.2 Description and Distribution

A description of the invertebrate population and its distribution and responses in regulated river systems such as those in the affected area was provided in Section 4.10 of the January 2008 Draft Planning Report/EIS (Reclamation and Ecology, 2008).

3.9.3.3 Habitat Conditions for Aquatic Invertebrates

Habitat conditions and the factors that affect habitat for aquatic invertebrates are the same as those described in Section 4.10 of the Draft Planning Report/EIS (Reclamation and Ecology, 2008). Key conditions that influence the aquatic invertebrate communities include flow controls and the presence of organic matter in the system (Reclamation and Ecology, 2008; Reclamation, 2005c).

3.10 Recreational Resources

The recreational setting for the Yakima River basin was described in Sections 4.12 and 5.12 of the Draft Planning Report/EIS. This section summarizes and incorporates that information and provides additional detail.

Washington provides a variety of recreation settings from designated wilderness areas to urban greenways. Within the Yakima River basin, the recreation opportunities are found in both developed and rural natural settings. The recreational areas most likely to be affected by the projects analyzed in this document are those associated with the reservoirs and the mainstem and tributaries of the Yakima River.

Recreationists are attracted to the basin by the quality of the scenery and water, and by the variety of recreation opportunities. Primary recreation activities include fishing the reservoirs and rivers for cold-water species; whitewater boating and kayaking; motorized boating; and other related activities such as camping, hiking, picnicking, and wildlife viewing.

The five primary rivers within the basin that supply recreation opportunities are the Yakima, Naches, Tieton, Cle Elum, and Bumping Rivers. The many tributaries of these rivers also provide additional areas for outdoor recreation.

The Yakima River has a national reputation for its high-quality fly fishing, one of the fastest growing activities on the river. The Yakima River is also considered a “blue ribbon” trout stream (Yakima Valley Visitors and Convention Bureau, 2008). The prime periods for fishing the river are February through May and September and October, although fishing occurs on the river throughout the year. There are camp sites along the Yakima River mainstem near the Keechelus, Kachess, and Cle Elum reservoirs, in the Yakima Canyon between the City of Ellensburg and Roza Dam, and in the City of Yakima. Several sections of the Yakima River are also popular for swimming and rafting during summer months.

The Naches River provides high quality trout fishing opportunities. In particular, the upper Naches River, above the confluence with the Tieton River, provides good fishing opportunities for wild westslope cutthroat, rainbow trout, and mountain whitefish (Jeff Tayer, personal communication, January 15, 2009). Although drift-boat access is limited, there is public access to substantial sections of the Naches River for wading and bank fishing from the Highway 410 right-of-way, as well as for inflatable watercraft.

The Tieton River below Tieton Dam does not provide high quality fishing opportunities, mainly due to poor quality habitat and low channel complexity, as described in Section 3.9.1.4 under “Channel Conditions.” This river has been highly altered and regulated so that it is no longer able to support a quality wild trout fishery (Jeff Tayer, personal communication, January 15, 2009).

The Tieton River has regionally acclaimed whitewater rafting during a three-week period in September when water from Rimrock Lake is released to enhance available irrigation in the Yakima valley. The rapids during that time are rated as Class III (Osprey Rafting Company, Inc., 2008). There is very little rafting on the Naches River, because of limited access due to private land ownership on adjacent lands.

The Bumping River and Bumping Lake are also popular recreation areas. Activities available in the immediate vicinity include boating, picnicking, swimming, multiple camp sites, and numerous hiking trails (Figure 2-4). For details on annual visitation to Bumping Lake and other recreation areas within the Yakima River basin, see Section 4.12.1.2 of the Draft Planning Report/EIS.

The Yakima River basin also has a Pacific Northwest regional reputation for motorized recreation opportunities associated with trail bikes, all-terrain vehicles (ATVs), and snowmobiles, primarily on U.S. Forest Service lands. In particular, the areas around the I-90 reservoirs and Rimrock Lake are popular recreation sites with trails for motorized vehicles.

3.11 Land and Shoreline Use

This section addresses land use and shoreline resources within the study area and describes governing policies for the Yakima River basin. The Land and Shoreline Use environment was described in Sections 4.13 and 5.13 of the Draft Planning Report/EIS. A complete description of the Shoreline Management Act (SMA) of 1972, and the water bodies within the project area that are covered under the SMA, can be found in Section 5.13.1.2 of the Draft Planning Report/EIS.

The Yakima River basin encompasses approximately 6,150 square miles, or 4 million acres. Land use within this large area is diverse, ranging from protected wilderness, to intensive agriculture, to areas of relatively dense urban development. Land ownership is divided between the state and federal governments, private parties, and the Yakama Nation. The urban/suburban developed areas of Cle Elum, Ellensburg, Selah, Yakima/Union Gap, Toppenish, Sunnyside, Grandview, Prosser, and the Tri-Cities make up only 1 percent of the total area within the Yakima River basin. The remainder of land uses in the area includes rangeland, timber harvest, and irrigated agriculture. Rangelands are primarily used and managed for grazing, military training, wildlife habitat, and tribal cultural activities. Approximately 25 percent of forested area is designated as wilderness. Diverse recreational activities, including hunting, fishing, camping, hiking, and boating occur across much of the project area.

3.12 Cultural Resources

Because the Yakima River basin is such a large geographic area, the description of the affected environment for cultural resources is necessarily quite broad. Section 4.20.1 of the Draft Planning Report/EIS describes the affected environment.

The Yakima River basin is the traditional territory of the Yakama Nation. The Yakama people continue to have access to their "usual and accustomed places" within the Yakima River basin for a variety of traditional uses, including areas outside of the reservation boundaries. Additionally, within the boundaries of the reservation, the Yakama Nation and its Tribal Historic Preservation Office (THPO) manage cultural resource concerns which would include traditional cultural properties, sacred sites, hunting and gathering locations, archaeological resources, historic resources, places related to legends, and ancestral sites. Information about the full range of cultural resources is not always accessible without detailed background research which is outside the scope of the current programmatic level Supplemental Draft EIS. As a result, the evaluation of cultural resources in this document is acknowledged to be limited in depth, with a focus on recorded sites to the exclusion of other important cultural resources. Once more specific plans are developed, more intensive research of the full spectrum of cultural resources would be required.

It is important to note that Native people do not view fish resources, water resources and cultural resources separately. The "cycle of salmon and other anadromous fish appearing and disappearing from the rivers ruled the rhythm of Indian life, [as] without a fish supply they were in danger of starving" (Netboy, 1980).

The affected environment for fish passage facilities at Cle Elum, Kachess, Keechelus, Rimrock, and Bumping Lakes would include the inlet and outlet of each of these water bodies. Some of these areas have been subject to previous cultural resource investigations, particularly Kachess and Keechelus Lakes. In contrast, there have been no surveys since 1995 on file at the Department of Archaeology and Historic Preservation (DAHP) in the vicinity of the inlet or outlet of Bumping Lake or Rimrock. According to the U.S. Forest Service, historic resources in the Bumping Lake area may include features associated with the original dam and recreation residences on the north shore that are over 50 years old (USFS, 2008b). Table 3-7 summarizes the recorded cultural resources within one mile of the inlet and outlet of each reservoir. This information is provided to contextualize the known cultural resources in these areas, but should be considered a rudimentary level of review.

Table 3-7 Recorded Cultural Resources near Reservoirs

Reservoir	Number of Recorded Resources within one mile	NRHP* Status
Bumping Lake, inlet	3 (2 historic, 1 unknown)	2 formally not eligible, 1 not evaluated
Bumping Lake, outlet	12 (8 precontact, 4 historic)	1 formally not eligible, 11 not evaluated
Lake Cle Elum, inlet	7 (4 precontact, 3 historic)	None formally evaluated
Lake Cle Elum, outlet	22 (6 precontact, 14 historic, 2 with precontact and historic components)	1 listed on NRHP, 2 formally not eligible, 19 not formally evaluated.
Kachess, inlet	none	
Kachess, outlet	12 (8 precontact, 3 historic, 1 with precontact and historic components)	1 listed on NRHP, 2 formally not eligible, 9 not formally evaluated.
Keechelus, inlet	9 (5 precontact, 3 historic, 1 with precontact and historic components)	3 formally not eligible, 6 not formally evaluated
Keechelus, outlet	13 (2 precontact, 9 historic, 2 with precontact and historic components)	4 formally not eligible, 9 not formally evaluated
Rimrock, inlet	24 (5 precontact, 18 historic, 1 fossil)	9 listed on NRHP, 14 not formally evaluated
Rimrock, outlet	28 (9 precontact, 19 historic)	1 listed on NRHP, 12 formally not eligible, 15 not formally evaluated

*NRHP = National Register of Historic Places

Storage elements and fish habitat enhancement elements have been previously addressed and are not further discussed here. The affected environment for storage elements was discussed in Section 4.20.1 of the January 2008 Draft Planning Report/EIS, or in documents prepared specifically for a proposed projects (such as the Ahtanum Creek Watershed Restoration Program [Ecology, 2005a] or Wymer reservoir [Reclamation and Ecology, 2008]). The affected environment for fish habitat enhancement elements includes major reaches of the Yakima River and the lower Naches River and their tributaries. These areas are described in general terms in Section 4.20.1 of the January 2008 Draft Planning Report/EIS.

3.13 Socioeconomics

The Integrated Water Resource Management Alternative might affect the five distinct components of socioeconomic conditions in Washington that are described in Section 5.14.1 of the January 2008 Draft Planning Report/EIS:

- The value of water-related goods and services;
- The level and composition of jobs and incomes;
- The distribution among different groups of the costs and benefits resulting from management of water resources;

- The socioeconomic structure; and
- Economic uncertainty and risk.

3.13.1 Value of Goods and Services

Section 5.14.1.1 of the January 2008 Draft Planning Report/EIS demonstrates that water and related resources in the Yakima River basin are economically important when, as part of an ecosystem, they produce goods and services that benefit people, impose costs on them, or both. The Integrated Water Resource Management Alternative would affect socioeconomic conditions in the basin by altering the supply and, hence, the value of individual goods and services derived from the basin's water-related ecosystems. Table 3-8 identifies types of goods and services that might be affected. These are the same types of goods and services potentially affected by the State Alternatives and addressed in Section 5.14.1.1 of the January 2008 Draft Planning Report/EIS. The actual location and extent of the Integrated Water Resource Management Alternative effects might be different from those described earlier, however.

Table 3-8 Types of Goods and Services Produced by Water-Related Ecosystems

Production and regulation of water	Production of food for humans	Production of ornamental resources
Formation and retention of soil	Production of raw materials for industry	Production of aesthetic resources
Regulation of atmosphere and climate	Pollination of wild plants and agricultural crops	Production of recreational resources
Regulation of floods and other disturbances	Biological control of pests and diseases	Production of spiritual, historic, and cultural resources
Regulation of nutrients and pollution	Production of genetic and medicinal resources	Production of scientific and educational resources
Provision of fish and wildlife habitat		

3.13.2 Jobs and Incomes

Water and related resources of the Yakima River basin influence jobs and incomes through the following three mechanisms, which are described in Section 5.14.1.2 of the January 2008 Draft Planning Report/EIS:

- Providing goods and services that are inputs to commercial activities;
- Producing goods and services that create a quality of life that influences the location decisions of households and businesses; and
- Providing other valuable ecosystem goods and services.

3.13.3 Distribution of Costs and Benefits

Socioeconomic issues associated with the management of the basin's water and related resources are discussed in Section 5.14.1.3 of the January 2008 Draft Planning Report/EIS.

3.13.4 Socioeconomic Structure

Section 5.14.1.3 of the January 2008 Draft Planning Report/EIS describes elements of the socioeconomic structure that might be affected by the State Alternatives. These same elements might be affected by the Integrated Water Resource Management Alternative.

3.13.5 Uncertainty and Risk

Section 5.14.2.5 of the January 2008 Draft Planning Report/EIS discusses economically important elements of uncertainty and risk that might be affected by the State Alternatives. These same elements might be affected by the Integrated Water Resource Management Alternative.

3.14 Visual Resources

Visual resources were described in Section 4.19 of the January 2008 Draft Planning Report/EIS. Additional discussion of visual resources at the five major reservoirs and the tributaries to the mainstem Yakima River is provided below.

3.14.1 Yakima River Basin Reservoirs

The lands around Keechelus Lake, Kachess Lake, and Cle Elum Lake are within the Wenatchee National Forest. This area is managed by the U.S. Forest Service (USFS) principally as scenic viewsheds. The USFS manages these lands according to its 1990 Land and Resource Management Plan (Forest Plan) (USFS, 1990). The lands around the lakes are also part of the Mountains to Sound Greenway National Scenic Byway, which is designated as a Washington State Scenic Byway. This designation is based on the route's outstanding scenic character and environmental experiences.

The USFS management directions for scenic viewsheds containing dams and reservoirs are described in terms of Visual Quality Objective (VQO), Variety Class, Sensitivity Level, and Distance Zone. These terms are from the Visual Management System (USFS, 1974 in Reclamation, 2008) and the National Forest Landscape Management handbooks. The visual quality objectives for the lakes are shown in Table 3-9 (Jackson, 2008 in Reclamation, 2008).

Table 3-9 Forest Plan Visual Quality Objectives by Management Area

Viewshed	Wenatchee National Forest Land Allocation, VQO
Keechelus Lake	Scenic Travel 1 (ST-1)-Retention VQO
Kachess Lake	Scenic Travel 1 (ST-1)-Retention VQO
Cle Elum Lake[1]	Scenic Travel 1 (ST-1)-Retention VQO
Bumping Lake[1]	Scenic Travel 1 (ST-1)-Retention VQO

Source: (Jackson, 2008 in Reclamation, 2008)

In 1995, the USFS adopted a new method of scenery management, called Landscape Aesthetics. The method is described in detail in *Landscape Aesthetics, A Handbook for Scenery Management* (USDA, 1995 in Reclamation, 2008c). In Landscape Aesthetics, Scenic Integrity corresponds to VQOs. Scenic integrity is a measure of the degree to which a landscape is visually perceived to be "complete." According to the USFS Scenic Integrity Levels, the lands around the lakes would have a high scenic integrity level (Jackson, 2008 in Reclamation, 2008c). High scenic integrity refers to landscapes where the valued landscape character "appears" intact.

The visual setting in which the structural modifications to existing facilities (e.g., spill gates, fish bypass systems, and canals) would occur under the alternatives considered in this Supplemental Draft EIS were largely described in the January 2008 Draft Planning Report/EIS. These areas include Wymer Dam, its reservoir, and Roza Diversion Dam. The visual settings of Keechelus Lake, Kachess Lake, and Cle Elum Lake are described below.

All the reservoirs in the Yakima River basin share the characteristic of being drawn down during the summer. The reservoirs are generally full in late spring and early summer, but are drawn down for irrigation starting in the spring. The reservoirs do not refill until the following spring. This leaves large areas of exposed shorelines from late summer through the winter. Stumps from trees that were logged before the dams were raised or constructed are exposed. In dry years, the reservoirs may not completely fill and the upper portions of the reservoir are exposed year-round. In some reservoirs, such as Keechelus, shrubby vegetation has grown up in the exposed shorelines. That vegetation is green during the summer.

3.14.1.1 Keechelus Lake

The visual setting for Keechelus Lake provides a perceived "natural" landscape, contrasting with a developed eastern shore—the I-90 corridor. Because of its proximity to I-90, Keechelus Lake is viewed by more people than any other Yakima River basin lake. The John Wayne Pioneer Trail is the principal development on the western shore of the lake.

The dominant landscape character is openness with dramatic contrasts of rock rising sharply to the east and water immediately adjacent to I-90 to the west, which curves around the eastern shore of the lake. Background views to the west are generally forested, with views of distant hills and mountains beyond. Douglas fir trees dominate the vegetation.

Foreground views to the west at the southern end of Keechelus Lake are dominated by I-90 and the Jersey barrier. The middle ground is of grasses between the road and the lake. The earth-filled Keechelus Dam can be seen in the background, as well as the mountains in the far distance. Beyond the dam, the Yakima River flows to the south. The dam's low profile relative to the surrounding landscape allows it to blend with the landscape, but it is visible and noticeable from I-90.

The John Wayne Pioneer Trail follows the western shoreline of Keechelus Lake. The view from the trail on the north end of the lake is very natural, with Gold Creek and native vegetation in the foreground, and stumps in the middle ground. To the south, views from the trail are dramatic and sweeping. The foreground is occupied by vegetation along and below the trail. Additional background views are of distant peaks. Evidence of development is limited to the narrow band of the highway, which is obscured by trees.

3.14.1.2 Kachess Lake

The visual setting for Kachess Lake provides a perceived "natural" landscape with limited development along the shores. Viewers of the lake are primarily recreationists and seasonal residents. Kachess Lake is located between the north-south trending Keechelus Ridge to the west and Kachess Ridge to the east. Background views are forested, with views of valley walls, ridges, and mountains beyond. Douglas fir trees dominate the vegetation. Development is generally limited to USFS roads on both the east and west shores, boat launches, and other recreational facilities.

Kachess Dam is located on the lower (southern) end of the lake and is approximately 115 feet tall and 1,400 feet in length with a gated spillway.

3.14.1.3 Cle Elum Lake

The visual setting for Cle Elum Lake provides a perceived "natural" landscape with limited development along the shores. Viewers of the lake are primarily recreationists and seasonal residents. Background views are forested, with views of valley walls, ridges, and mountains beyond. Douglas fir trees dominate the vegetation. Development is generally limited to USFS roads on the east shore, boat launches, and other recreational facilities.

Cle Elum Dam is located on the lower (southern) end of the lake and is approximately 165 feet tall and 1,800 feet in length with a gated spillway.

3.14.2 Naches River Basin Reservoirs

The visual settings of the Naches River basin reservoirs are described below.

3.14.2.1 Bumping Lake

The visual setting for Bumping Lake provides a perceived "natural" landscape, with relatively limited development in evidence. Development at the lake includes Bumping Lake Dam, USFS campgrounds and day use area (south shore), recreational residences, the Bumping Lake Marina (north shore), and USFS roads and trailheads. The existing dam is 61 feet tall and 2,925 feet in length, with an outlet to a 1,300-acre glacial lake in the floor of Bumping River valley. The dam site is a deep, steep-walled canyon. Glacial deposits dominate the valley floor. Mixed-conifer forests surround the lake. Viewers are primarily boaters and hikers, summer residents, and Goose Prairie residents.

According to the USFS Scenic Integrity Levels, the lands around Bumping Lake have a high scenic integrity level (Jackson, 2008 in Reclamation, 2008). The landscape character appears generally intact. The William O. Douglas Wilderness Area is located approximately one mile from the north and south shores of Bumping Lake and is managed in a natural state.

3.14.2.2 Rimrock Lake

The visual setting at Tieton Dam/Rimrock Lake provides a perceived "natural" setting characterized by extremely rugged terrain. The existing Tieton Dam is located in a steepsided, mountainous valley, carved by the Tieton River. The valley area is forested; the area to the east is more open and covered with sagebrush. Tieton Dam is visible from Highway 12. The downstream face of the dam generally does not support vegetation and the spillway channel is generally barren, solid rock and concrete channels. Because of the attractive combination of the forested valley and the lake, visual quality is generally high.

3.14.3 Yakima and Naches River Tributaries

The landscape in which fish habitat enhancements would take place is both the mainstem and tributaries of the Yakima River and the Naches River. This is a large area with varied landscapes, but is most commonly characterized by irrigated agricultural lands and other large-lot rural development. Agricultural lands are a mix of orchards, vineyards, and row/field crops. Agricultural infrastructure (canals and appurtenant facilities) is strongly in evidence. Structures are generally residential and farm-oriented.

Typical foreground and middle ground views are of valley agricultural lands, rangeland, and rolling hills of sagebrush. Background views are of mountains and sky. Its visual character and quality are also defined by dispersed residential areas, existing transmission and generation facilities, and the way topography and vegetation relate to the sky and the changing patterns of light throughout the day and year. All of these factors contribute to the area's visual interest and perceived visual quality. Viewers would typically be residents of the low-density, scattered valley homes, dispersed recreationists, and motorists on highways and on rural roads in the area.

3.15 Transportation

This section addresses road/highway and railroad transportation facilities in and serving the areas where alternative project facilities would be located. No air or navigable waterway transportation system or facilities would be involved or impacted by any of the alternatives. Transportation facilities were described in Sections 4.16 and 5.16 of the January 2008 Draft Planning Report/EIS.

The elements of the Integrated Water Resource Management Alternative that would likely affect transportation facilities are new or expanded storage reservoirs and potential structural changes to existing facilities. Two elements of the alternative would expand storage capacity in the Yakima River basin—the two Bumping Lake expansion options and Pine Hollow reservoir. The Wymer reservoir alternative was evaluated in the January 2008 Draft Planning Report/EIS.

Regional and local access to the proposed Bumping Lake expansion site, as well as sites and alignments of all appurtenant facilities, would be via SR-410, a two-lane roadway extending northwest from Yakima in northwest Yakima County to National Forest Development Road 1800. There are no public roads present in the Bumping River basin, where Bumping Lake would be expanded, nor are there any rail facilities. The only access is a U.S. Forest Service road that is closed in the winter.

Regional and local access to the proposed Pine Hollow reservoir site, as well as sites and alignments of all appurtenant facilities, would be via Ahtanum Road, a two-lane local roadway extending west from the southwest end of the City of Yakima in Yakima County. There are no public roads present in the basin where Pine Hollow reservoir would be built, nor are there any rail facilities. The only other roads are several unpaved access roads to private residences just to the south of where the reservoir would be constructed.

CHAPTER 4.0 SHORT-TERM IMPACTS AND MITIGATION MEASURES

This chapter describes the short-term impacts of the alternatives proposed in this Supplemental Draft EIS. Short-term impacts refer to those that are construction related or of limited duration. Possible mitigation measures for the impacts are also discussed. Because this is a Programmatic EIS and the details of construction and project implementation are not known, short-term impacts are discussed in general terms. Specific projects may be required to undergo additional environmental review when proposed to identify specific short-term impacts.

Impacts are evaluated for both the No Action Alternative and the Integrated Water Resource Management Alternative. The Integrated Water Resource Management Alternative includes seven main elements—fish passage, modifying existing structures and facilities, new storage, ground water storage, fish habitat enhancement, enhanced water conservation, and market-based reallocation of water resources. Impacts associated with the elements are presented individually first. Short-term cumulative impacts are presented at the end of this chapter.

4.1 Earth

4.1.1 No Action Alternative

Under the No Action Alternative, various entities and agencies would undertake individual actions that could result in short-term impacts to earth resources similar to those described for the individual elements below. Construction associated with these actions has the potential to disturb the ground and increase the potential for erosion and delivery of sediments to the Yakima River system. Any resulting impacts would be evaluated separately. These projects would not be part of an integrated water resource management approach.

4.1.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Short-term impacts of the individual elements would be primarily related to construction activities that may result in erosion and sedimentation. These elements are discussed in the following sections.

4.1.2.1 Fish Passage Element

Construction activities related to fish passage, including structural changes to the existing facilities, or improvements to fish habitat associated with the Cle Elum, Bumping Lake, Tieton, Keechelus, or Kachess Dams, or on the mainstem Yakima River and its tributaries, could require ground disturbance that would result in the potential for erosion and slope stability impacts. Construction activities may include adult fish upstream collection and transportation facilities, temporary cofferdams, new spillways, multi-level gated intake structures, and/or construction of spawning channels or riffles. Because all of the proposed fish passage elements would occur on or near streams, they have the potential to increase the delivery of sediment to surface waters.

4.1.2.2 Modifying Existing Structures and Facilities Element

Modifications requiring construction activities would cause short-term impacts similar to those discussed in Section 4.1.2.1. Construction activities for this element could include structural changes to existing water supply facilities such as modification of spill gates, outfalls, and canal/piping systems, and the installation of pump systems for pipe pressurization.

Operational modifications associated with construction activities would have minimal impacts on erosion and sediment supply to surface waters.

4.1.2.3 New Storage Element

The new storage element would have the highest potential for short-term impacts to earth resources. Creating new or expanded storage reservoirs would involve clearing and excavating for road construction, excavating along the shoreline, and constructing new dams or modifying existing dams. Excavation and fill activities would increase the potential for erosion during construction, although erosion could be minimized through the use of best management practices.

Expansion of Bumping Lake could cause additional soil erosion from construction activities within the borrow areas and construction of access roads. Exposed soils in the borrow area and on access roads would be subject to surface runoff during the fall, winter, and spring periods when precipitation occurs most heavily. Loss of soil during the construction period would contribute to turbidity in the river (Reclamation, 1979). However, the increased turbidity would likely be short-term and would not have long-term impacts on downstream water quality (Reclamation, 1993).

Impacts associated with the proposed Pine Hollow reservoir were evaluated in the Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005). Because the proposed reservoir is off-channel, the potential for the delivery of sediments is less than for a reservoir located on a stream or tributary.

4.1.2.4 Ground Water Storage Element

Ground water storage elements requiring construction activities would cause short-term erosion impacts similar to those discussed in Section 4.1.2.1, and were described in Section 5.5.2.3 of the January 2008 Draft Planning Report/EIS. Construction activities for this element could include water treatment facilities, wells, conveyance facilities, and/or infiltration basins.

4.1.2.5 Fish Habitat Enhancement Element

Fish habitat enhancement projects could include reconnecting side channels, floodplains, and off-channel habitat to streams; restoring natural channels, riparian areas, and wet meadows; relocating infrastructure; and replanting and restoring riparian areas in the Yakima River and many of its tributaries. Enhancement-related construction activities may include placement of large woody debris and engineered log jams in streams, bank reshaping, channel reconstruction, and construction of fish passage facilities. Enhancements requiring ground disturbance would cause the same type of short-term impacts discussed in Section 4.1.2.1.

4.1.2.6 Enhanced Water Conservation Element

Construction of canal lining, pipelines, pump stations, reregulating reservoirs or on-farm irrigation improvements could impact upland sediment resources by disturbing soils and could temporarily increase soil erosion.

4.1.2.7 Market-based Reallocation of Water Resources

Construction of new irrigation facilities that are needed to utilize transferred water could increase soil erosion. The impacts would be similar to those of the Enhanced Water Conservation Element, except smaller in scale.

4.1.3 Mitigation Measures

Site-specific geotechnical studies would facilitate identification of subsurface issues, unstable slopes, and other local factors that can contribute to slope instability and increase erosion potential. These studies would be used in the design of project-specific best management practices and temporary erosion and sediment control plans in accordance with county and/or Ecology requirements. Requirements for each construction project would be defined through review by state and local regulatory agencies. The following measures could be included to minimize the potential for sediment production and delivery to stream channels:

- Timing construction activities to avoid earth disturbances during periods of high precipitation;
- Using straw bales, silt fencing, or other suitable sedimentation control devices;
- Washing truck tires to reduce tracking of sediments off of construction sites;
- Covering exposed soil stockpiles and exposed slopes;
- Using straw mulch and erosion control matting to stabilize graded areas where appropriate;
- Retaining vegetation where possible to minimize soil erosion;
- Seeding or planting appropriate vegetation on exposed areas as soon as possible after work is completed;
- Constructing temporary sedimentation ponds to detain runoff waters where appropriate;
- Using berms and other on-site measures to prevent soil loss;
- Monitoring downstream turbidity during construction to document the effectiveness of implemented measures; and
- Visually monitoring for signs of erosion and for correct implementation of control measures.

4.2 Climate Change

Projects proposed in this Supplemental Draft EIS could both affect and be affected by climate change. Projects can affect climate change by increasing carbon emissions that contribute to global warming. As noted in Section 3.2, climate change could affect precipitation, snowmelt and runoff in the Yakima River basin which could affect water management in the basin. For purposes of this Supplemental Draft EIS, the effect of proposed projects on climate change is discussed as a short-term impact and the effect of climate change on the projects is discussed as a long-term impact (Section 5.2).

4.2.1 No Action Alternative

The No Action Alternative would result in a continuation of currently planned actions, implementation of which would occur independently. Some of these actions may help to reduce effects associated with climate change, others may worsen the effects. Without a comprehensive evaluation of all the proposed projects, it would be difficult to assess. Piecemeal implementation would likely result in a continuation of current trends. Projects implemented under the No Action Alternative would undergo separate NEPA or SEPA analysis, if appropriate.

4.2.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

For all the elements of the Integrated Water Resource Management Alternative, greenhouse gas emissions could be generated during construction. The amount of emissions generated would depend on the amount of heavy construction and the duration of construction for specific projects. Since no project details are known at this time, the following sections discuss the extent and duration of construction for each element. Potential greenhouse gas emissions from construction projects would be estimated and potential impacts analyzed separately when specific project details are available.

4.2.2.1 Fish Passage Element

Construction work for fish passage elements would last two to three years. Most of the heavy construction work would last only a few months out of that time period. During the remainder of the construction period, increased emissions would primarily be limited to worker vehicles accessing the sites. Because potential storage sites are in relatively remote areas, workers would likely have to drive 20 to 50 miles to access the sites. Heavy construction equipment would be needed for excavating intake structures, cofferdam placement and removal, hauling materials, concrete pouring, and similar activities.

4.2.2.2 Modifying Existing Structures and Facilities Element

Most canal modification and pipe trenching work would be complete at any one location within a few weeks, with overall construction lasting a few months. Emissions would be generated by worker vehicles, trenching equipment, concrete pouring, hauling materials, and similar activities.

4.2.2.3 New Storage Element

The new storage element has the greatest potential for generating greenhouse emissions because of the duration and intensity of construction. Construction would last four to 6 years and would require extensive use of heavy machinery. Equipment would be required for excavation and grading, hauling materials, access road construction, vegetation removal from inundated areas, and similar activities. Because potential storage sites are in relatively remote areas, workers would likely have to drive 20 to 50 miles to access the sites.

4.2.2.4 Ground Water Storage Element

Construction activities for Ground Water Storage Elements could last from a few weeks to several months. Facilities constructed for this element would cause the same type of short-term impact as those described in Section 4.2.2.2.

4.2.2.5 Fish Habitat Enhancement Element

Construction associated with this element would likely generate a limited amount of emissions. Most construction work for fish habitat enhancement elements would be complete at any one location within a few weeks. Heavy equipment would be limited to those needed for excavation and grading. Many of the areas where enhancements would occur are closer to populated areas, limiting worker vehicle miles.

4.2.2.6 Enhanced Water Conservation Element

Construction required for the Enhanced Water Conservation Element would cause the same type of short-term impact as those described in Section 4.2.2.2.

4.2.2.7 Market-based Reallocation of Water Resources

The element would generate the least amount of emissions. Construction of new irrigation facilities that are needed to utilize transferred water would result in impacts similar to those of the Enhanced Water Conservation Element, except smaller in scale.

4.2.3 Mitigation Measures

Emissions from construction vehicles could be reduced by following best management practices to minimize emissions, such as maintaining engines in good working order and minimizing trip distances. Other measures to minimize emissions include coordinating project planning, combining workers' trips, and using local materials.

4.3 Surface Water

4.3.1 No Action Alternative

Several projects in the No Action Alternative may have a short-term impact on surface water. For example, YRBWEP water conservation projects would require construction of canal lining, pipelines, pump stations and other irrigation district improvements. Habitat restoration efforts would require construction of off-channel areas, removal of fish passage barriers, placement of large woody debris and other actions. These construction efforts may impact surface water through increased sediment loading. The potential would depend on the proximity of the project to a water body, the volume of sediment generated, the condition of vegetative buffers between the site and the water body, and the BMPs applied to control erosion. Sedimentation may increase turbidity and affect the substrate condition in streams until construction is completed. The level of impact would vary with the amount of sediment entering the water body. Other potential short-term impacts could include an interruption in water service during construction of irrigation system improvements, and diversion of surface water around construction areas during dewatering.

4.3.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

4.3.2.1 Fish Passage Element

This element may have a short-term impact on surface water bodies near the construction area of the project elements, including the Kachess River, Cle Elum River, Yakima River, Bumping River, and Tieton River. Because construction would take place in close proximity to water bodies, the potential for increased sediment load would depend on BMPs applied for erosion control.

There is also the potential for short-term draw down of reservoir water levels to facilitate the construction of structures on the dam or within the reservoir. The temporary draw downs would reduce the level of water in the reservoir and would affect stream flows downstream. The duration of those potential reductions is not known but would likely be several months.

4.3.2.2 Modifying Existing Structures and Facilities Element

Operational changes would not likely have a short-term impact on surface water. However, construction may increase sediment loading in the Yakima River. Piping of irrigation laterals in the KRD, or moving the water supply for part of the WIP to the Satus Creek area may cause temporary disruptions in water supply for the areas the laterals serve if the construction is during an irrigation season. This disruption would occur when switching service from the canal lateral to a pipe lateral. The disruptions would be short, a few days to a week to prevent damage to crops.

4.3.2.3 New Storage Element

Construction of an enlarged Bumping Lake may increase sediment loading in the Bumping River. The increase in sediment loading would likely be greater than for other projects elements because the magnitude of construction would be much greater.

Construction of Wymer Dam may increase sediment loading in the Yakima River, but because the construction location is off-channel and the construction effort would be smaller in magnitude, sediment loading would likely be less than Bumping Dam. The South Branch, North Branch, and pipeline options may cause temporary disruptions in water supply to the KRD during construction. Actual disruption would depend on construction timing.

The Bumping River would need to be bypassed around the construction area of the new Bumping Dam. This bypass would last the duration of the construction project. Similarly, Lmuma Creek would need to be bypassed around the construction area of Wymer Dam for the duration of the construction project. In addition, the water supply option for Wymer Dam may require similar bypasses of a number of streams between Cle Elum Dam and Wymer reservoir to allow construction of a canal or pipeline.

Implementation of the Ahtanum Creek Watershed Restoration Program and Pine Hollow reservoir may increase sediment loading, but construction of the reservoir is off-channel, so sediment loading would be less than for an on-stream reservoir such as the Bumping Lake expansions. Impacts associated with the Pine Hollow reservoir were described in the Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005). Construction of new irrigation pipelines may temporarily impact water deliveries for the Wapato Irrigation Project and the Ahtanum Irrigation District depending on the timing of construction.

4.3.2.4 Ground Water Storage Element

The temporary impacts of the Ground Water Storage Element on surface water resources were described in Section 5.2.3.3 of the January 2008 Draft Planning Report/EIS.

4.3.2.5 Fish Habitat Enhancement Element

This element may have a short-term impact on surface water in the Yakima River and its tributaries at construction locations. When enhancing fish habitat, there is the possibility of construction occurring in-stream, which may temporarily increase sediment loading.

4.3.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on surface water resources were described in Section 5.2.3.1 of the January 2008 Draft Planning Report/EIS.

4.3.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on surface water resources were described in Section 5.2.3.2 of the January 2008 Draft Planning Report/EIS.

4.3.3 Mitigation Measures

Mitigation for short-term impacts to surface water from construction activities would be similar to those described in Section 4.1.3. To mitigate short-term disruptions in surface water irrigation supply due to construction activities, the irrigation districts would coordinate with water users and construction personnel to ensure that construction activities are scheduled to minimize disruptions. To the extent possible, conveyance construction would occur outside the irrigation season. Mitigation for stream bypasses would be negotiated with fish agencies as part of permitting for individual projects.

4.4 Water Rights

4.4.1 No Action Alternative

Several projects included in the No Action Alternative have the potential to cause short-term impacts to water rights. Several projects included in the No Action Alternative include provisions to acquire water rights on a permanent or temporary basis to improve instream flows. Water rights acquired by lease for a one-year term would be considered to have short-term impacts. Impacts associated with short-term leases of water rights would be similar to those described in Section 5.2.5 of the January 2008 Draft Planning

Report/EIS. Impacts to water rights would be evaluated separately as those projects are carried forward.

4.4.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

The Yakama Nation holds a water right for instream flow for fish with a priority date of time immemorial. The water right is not quantified. The court in the Yakima Adjudication confirmed a right to the "minimum instream flow necessary to support aquatic life." Alternatives that would result in an increase in stream flow would not change the water right confirmed by the court; however, for purposes of this analysis an increase in streamflow will be considered to have a positive impact on the Yakama Nation's water right for fish.

4.4.2.1 Fish Passage Element

No short-term impacts to water rights are expected from the fish passage element.

4.4.2.2 Modifying Existing Structures and Facilities Element

Operational Changes at Existing Facilities

Operational changes at the power generation facilities at Roza Dam and Chandler Power Plant have the potential to cause short-term impacts to the ability to fully exercise the water rights for power generation. At Roza the proposal is to reduce or eliminate diversions for power production during smolt out-migration from April 1 to May 31. At Chandler Power Plant the proposal is to increase the threshold stream flow at which Reclamation reduces diversions from the Yakima River for power production. To the extent either of these proposals is implemented on a short-term basis Reclamation's ability to exercise their full water right for power production would be temporarily reduced. The actions would increase stream flow in the Yakima River bypass reaches, 15 miles at Roza Dam and 12 miles at Chandler Power Plant. This increased stream flow would have a positive impact on the Yakama Nation's water right for instream flow for fish.

KRD Canal Modifications to Improve Tributary Flows

Four tributaries in the KRD have been identified as having instream flow problems: Taneum, Manastash, Big and Little Creeks. One proposal is to modify the KRD Main Canal and South Branch Canal to provide water to water users who divert from the tributaries. In addition, it has been suggested that acquiring water from those water users now diverting from the tributaries could improve flows in the tributaries. To the extent water is acquired by lease, there would be positive short-term impacts to stream flow and to the Yakama Nation's water right for instream flow for fish.

4.4.2.3 New Storage Element

No short-term impacts to water rights are expected from the new storage element.

4.4.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on water rights were described in Section 5.2.5.3 of the January 2008 Draft Planning Report/EIS.

4.4.2.5 Fish Habitat Enhancement Element

No short-term impacts to water rights are expected from the fish habitat element.

4.4.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on water rights were described in Section 5.2.5.1 of the January 2008 Draft Planning Report/EIS.

4.4.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on water rights were described in Section 5.2.5.2 of the January 2008 Draft Planning Report/EIS.

4.4.3 Mitigation Measures

The potential negative short-term impacts to water rights would be to Reclamation's water rights for power generation at Roza Dam and Chandler Power Plant. These options would only be implemented with Reclamation's agreement and would not require mitigation. The other anticipated short-term impacts to water rights are positive impacts and no mitigation is required.

4.5 Ground Water

4.5.1 No Action Alternative

Construction associated with the ongoing efforts of the agencies and groups identified in Section 2.2 has the potential to result in temporary ground water impacts in the Yakima River basin. Those impacts largely relate to the need for dewatering during construction. Any resulting impacts would likely be minor and would undergo separate NEPA or SEPA evaluation as appropriate.

4.5.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Short-term impacts to ground water largely relate to the need for dewatering during construction. Construction dewatering activities may cause temporary, localized reductions in ground water levels and availability in the alluvial or sedimentary aquifer systems. The amount of necessary ground water withdrawals and the disposal method would be determined on a site-specific basis. Should dewatering be required, it would be conducted in accordance with Ecology requirements.

4.5.2.1 Fish Passage Element

If construction dewatering occurs, the construction of fish passage elements may impact short-term ground water quantity.

4.5.2.2 Modifying Existing Structures and Facilities Element

Construction associated with modifying existing structures may impact short-term ground water quantity if construction dewatering occurs. No short-term ground water impacts are expected during canal lining or piping.

4.5.2.3 New Storage Element

During excavation for pumping plants, tunnels, and appurtenant structures associated with storage options, dewatering may be necessary in some areas. The amount of dewatering necessary would depend on the site-specific conditions. Some provision for dewatering and disposal of pumped water would be necessary. Construction of an expanded reservoir at Bumping Lake or the Pine Hollow reservoir would have limited impact on ground water resources.

4.5.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on ground water were described in Section 5.3.2.3 of the January 2008 Draft Planning Report/EIS.

4.5.2.5 Fish Habitat Enhancement Element

No ground water impacts are expected from construction activities related to habitat restoration.

4.5.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on ground water were described in Section 5.3.2.1 of the January 2008 Draft Planning Report/EIS.

4.5.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on ground water were described in Section 5.3.2.2 of the January 2008 Draft Planning Report/EIS.

4.5.3 Mitigation Measures

The following measures could be used to reduce the potential for construction-related impacts:

- Conduct site-specific hydrogeological studies prior to construction to determine impacts to short-term ground water levels and quantity from dewatering activities;
- Treat ground water withdrawn for dewatering prior to release to surface waters or ground water to reduce impacts to water quality; and
- Schedule construction during the dry summer months, when possible, to reduce the potential for generating stormwater that could enter ground water.

In addition, all dewatering would be conducted in accordance with Ecology and local requirements.

4.6 Water Quality

4.6.1 No Action Alternative

Construction associated with the ongoing efforts of the agencies and groups identified in Section 2.2 has the potential to result in temporary water quality impacts in the Yakima River system, including sedimentation, increased turbidity, changes in temperature, and contamination from spills or construction accidents. Any resulting impacts would likely be minor and would undergo separate NEPA or SEPA evaluation as appropriate.

4.6.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

There would be short-term impacts to water quality from instream and near-stream construction activities. The required instream work may cause local, temporary increases in turbidity during installation and removal of cofferdams. These increases would likely be most intense near the construction activity itself and would decrease over time and distance. Short-term impacts to water quality could also result from near-stream soil disturbance; inadvertent release of fuel, oil, or other construction fluids; dewatering; and cast-in-place concrete work. Both sediment and contaminants can increase turbidity and affect other water quality parameters such as the amount of available oxygen in the water.

4.6.2.1 Fish Passage Element

Excavation for juvenile fish passage intake structures would be located in the drawdown zone of the reservoirs behind cofferdams. Excavation for the intake structures and placement of cofferdams would be done in the dry during normal reservoir drawdown, effectively isolating the construction activities within the dewatered cofferdams. Very little sedimentation or turbidity would result as cofferdam removal would also occur in the dry during reservoir drawdown.

Construction of adult fish barriers would typically be done in two phases by installing a cofferdam spanning one half the width of the river, completing construction of that portion of the barrier, removing the cofferdam, then repeating for the remaining half of the river. The cofferdams would consist of large sandbags, concrete blocks and gravel. The cofferdam itself is the primary measure ensuring that turbidity and sedimentation from construction activities do not adversely affect water quality. A relatively minor amount of sedimentation would occur during the installation of the cofferdam. Effects of the turbidity from placing the cofferdams are not anticipated to extend more than 200 feet downstream of the site during the typical 5-day construction period. Some turbidity and sedimentation would also occur during cofferdam removal (Reclamation, 2008).

Temporary minor increases in turbidity and sedimentation would occur during construction of the adult fish upstream collection and transportation facilities. Some disturbance of the streambanks would occur as fish ladders are constructed. Stockpile and staging areas would be isolated with a containment berm or physical structure to reduce erosion and sediment impacts to reservoir and river water quality. Access roads may also increase sediment input to the rivers during precipitation events.

The construction of some fish passage elements would likely require cast-in-place concrete, which could impact water quality by increasing pH or turbidity. The demolition of existing structures could also result in temporary water quality impacts.

Construction impacts would be temporary and could be minimized or prevented through the proper implementation of best management practices as discussed in Section 4.6.4.

4.6.2.2 Modifying Existing Structures and Facilities Element

Construction to support the modification of existing structures and facilities would cause short-term water quality impacts similar to those discussed above.

4.6.2.3 New Storage Element

Construction of new storage elements could impact short-term water quality. During dam construction, a cofferdam and bypass channels may be required to route the flowing water away from construction activity. Filling reservoirs would inundate new areas, and cause decaying vegetation to increase the availability of nutrients in the reservoir and downstream waters. This new source of nutrients would slowly decline over time.

Construction activities (e.g., excavation, trenching, drilling for pipe installation) could alter the interaction between surface water bodies and local ground water in systems where the two resources are hydrologically connected. In these circumstances, altering the water quality of one source could affect the water quality of other sources at downgradient locations. Best management practices would be used during construction to minimize the potential for contaminants to enter waters.

Constructing reservoirs in a new location would generally cause more extensive water quality impacts than modifying existing facilities. Constructing activities of a new reservoir and its associated water conveyance facilities would increase the potential for erosion and contamination over large geographic areas and therefore have the potential to cause substantial short-term water quality impacts. In contrast, construction to modify Bumping Lake's storage capacity would be localized and is expected to have less water quality impacts.

4.6.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on ground water were described in Section 5.6.2.3 of the January 2008 Draft Planning Report/EIS.

4.6.2.5 Fish Habitat Enhancement Element

Construction of habitat enhancements is expected to impact water quality on a short-term basis. The inundation of new land during floodplain reconstruction would increase the availability of nutrients to impounded and downstream waters. Degradation of surface and ground water could result from migration of soil contaminants from lands that are newly inundated. The levels of contaminants in inundated lands would largely be determined by historical land use practices. Agricultural areas are likely to have elevated levels of pesticides and herbicides, and areas near major roads are likely to have elevated levels of metals and petroleum products. The migration of contaminants would decline over time.

4.6.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on ground water were described in Section 5.6.2.1 of the January 2008 Draft Planning Report/EIS.

4.6.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on ground water were described in Section 5.6.2.2 of the January 2008 Draft Planning Report/EIS.

4.6.3 Mitigation Measures

Mitigation measures for short-term impacts to water quality would be similar to those described in Sections 4.1.4 and 4.5.4. Compliance with state and local water quality regulations would be required.

Contracts for construction projects would include language to protect water quality during construction. The contractor would be required to keep all heavy equipment clean and free of grease, hydraulic oil, and other contaminants. The contractor would also be required to prepare and implement a spill prevention, control, and containment plan and develop and implement a temporary erosion and sediment control plan. Turbid or contaminated dewatering water would be treated prior to discharge as necessary to comply with the requirements of the Washington Administrative Code, the construction NPDES permit, and/or the local grading permit. Appropriate measures for handling and storing construction materials, fuels, and solvents would also be required.

During construction, monitoring programs would likely be required to ensure compliance with the site erosion control plans and with regulatory requirements. The construction contractor could be required to measure parameters such as turbidity, temperature, and pH of surface water discharge, and visually monitor for signs of erosion and for correct implementation of control measures.

All in-water work would comply with the requirements of a Hydraulic Project Approval (HPA) issued by Washington Department of Fish and Wildlife (WDFW), including measures to avoid turbidity impacts.

Subsurface exploration for contaminants in floodplain areas prior to inundation would help identify problem areas. Contaminated soils and sediments could then be removed to minimize leaching and migration of nutrients and contaminants.

4.7 Hydropower

4.7.1 No Action Alternative

Short-term impacts to hydropower are not expected to occur in the No Action Alternative because no change in flow through a hydroelectric facility would occur.

4.7.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Short-term impacts to hydropower are not expected to occur for any of the proposed elements because no change in flow through a hydroelectric facility would occur. Bypassing flows around the Roza and Chandler power plants may result in long-term impacts as described in Section 5.7.

4.7.3 Mitigation Measures

Because no impacts to hydropower are anticipated, no mitigation measures are proposed for short-term impacts to hydropower.

4.8 Vegetation and Wildlife

4.8.1 No Action Alternative

Under the No Action Alternative, continued current trends or project implementation would occur and there would be no benefits from integrated implementation. Some of the individual actions undertaken by various entities and agencies that are currently funded and have a schedule for implementation could require removal of vegetation or could result in temporary displacements of wildlife. This includes projects for water storage, artificial supplementation programs, and fish passage and habitat improvement. These projects would undergo separate NEPA or SEPA analysis, if appropriate, and would comply with permitting requirements.

4.8.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

4.8.2.1 Fish Passage Element

Construction of fish passage facilities could result in the disturbance of vegetation at the existing reservoirs (where vegetation is present). Much of the disturbance would occur on lakebed substrate in the drawdown zone of the reservoir, which is absent of vegetation. Reclamation (2008c) provides approximate areas of disturbance for facilities located at Cle Elum and Bumping Lakes, but no similar detailed information is available for Kachess, Keechulus, or Rimrock Lakes.

In general, construction areas would be adjacent to existing spillways or dam abutments and embankments, where vegetation is limited to grasses or is nonexistent. The construction of a fish passage conduit may result in the removal of some second-growth conifer forest. Conifer removal would be minimized to the extent possible. Staging and stockpile areas, access roads, and dam crossings would be located in already disturbed areas with little existing vegetation.

On the west side of Cle Elum Dam, approximately 200,000 square feet of forest consisting of young Douglas fir, Ponderosa pine, and bitterbrush would be temporarily replaced by a stockpile and staging area (Reclamation, 2008c). The fish passage conduit would temporarily disturb about 640,000 square feet of Douglas fir, black cottonwood, lodgepole pine, and chokecherry along with the dirt roadway adjacent to the existing spillway facilities. The majority of these areas would be revegetated.

According to Reclamation (2008c), staging and stockpile areas at Bumping Lake would temporarily disturb about 200,000 square feet of second-growth Douglas fir habitat for the juvenile fish passage intake facility, as well as the flat disturbed area at the foot of the dam for the adult fish collection facility. The area at the foot of the dam is heavily disturbed with little vegetation and is of minimal value for wildlife. However, the stockpile area for the juvenile fish passage intake structure could remove second-growth forest habitat depending on the exact location, temporarily adversely affecting species such as deer and elk. This area would be revegetated after construction of the project is completed.

Any existing wildlife in the reservoir area, such as birds and small mammals, would be temporarily displaced by the noise and construction activities.

4.8.2.2 Modifying Existing Structures and Facilities Element

The majority of the proposed modifications would result in no impacts to plants and wildlife because construction would take place in already disturbed areas. Construction and noise associated with the piping of five laterals on the Main Canal and five laterals on the South Branch Canal of the KRD would result in temporary impacts to wildlife in the vicinity.

4.8.2.3 New Storage Element

Construction of new storage facilities would include the construction of new access roads, removal or vegetation in the dam area, and other construction activities that would remove vegetation and disturb wildlife. Construction of a new rock-fill dam downstream of the existing Bumping Lake Dam would require access roads that may result in temporary vegetation removal. Similarly, the construction of the new 180-foot dam for the Pine Hollow Reservoir would require the removal of vegetation in the dam area, which currently consists primarily of grasses and is void of shrubs or trees. Conservation measures would likely include vegetation removal along conveyance lines, including existing riparian vegetation along the Johncox Ditch, for lining or piping canals. Removal of riparian vegetation could affect wildlife using the habitat during construction. Habitat restoration projects would likely include the removal of non-native vegetation. Disturbed areas would be replanted with conifers and riparian vegetation after construction is complete.

Wildlife in the vicinity of new storage elements, including construction of water conveyance facilities for the proposed Wymer Dam, would likely be temporarily displaced by noise and construction activities. The restored riparian areas should provide improved habitat for wildlife.

4.8.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on vegetation and wildlife were described in Section 5.7.2.3 of the January 2008 Draft Planning Report/EIS.

4.8.2.5 Fish Habitat Enhancement Element

Construction of some habitat restoration projects could result in temporary impacts to existing vegetation. Projects that involve stream bank reshaping, channel reconstruction, and restoration of fish passage at manmade barriers would likely remove existing vegetation. These projects would also likely include the removal of non-native vegetation. Wildlife in the vicinity of the restoration project may be temporarily displaced by noise and construction activities. Habitat restoration projects are intended to provide improved native plant species diversity and habitat for wildlife; therefore, short-term impacts would be temporary.

4.8.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on vegetation and wildlife were described in Section 5.7.2.1 of the January 2008 Draft Planning Report/EIS.

4.8.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on vegetation and wildlife were described in Section 5.7.2.2 of the January 2008 Draft Planning Report/EIS.

4.8.3 Mitigation Measures

Disturbance of riparian vegetation would be minimized during construction of the adult fish collection facilities and barrier dams. Where possible, vegetation that is removed for construction would be replaced with appropriate native plant species. Habitat restoration projects are expected to be an overall benefit to vegetation and wildlife.

No mitigation is proposed for the temporary displacement of wildlife because this is expected to be a minor impact. Wildlife is likely to return following construction, except in the area that would be inundated by a new reservoir or the expansion of Bumping Lake.

4.9 Fish and Aquatic Resources

4.9.1 No Action Alternative

Under the No Action Alternative, various agencies and other entities would continue to undertake individual actions to restore and enhance fish and aquatic resources in the Yakima basin. These actions would likely resulting in short-term impacts such as dewatering of instream habitat, disturbance of juvenile salmonids, disturbance of shoreline habitat, increased water temperatures, sedimentation, fish passage obstruction, and potential for accidental spills of hazardous materials (i.e., cement, fuel, hydraulic fluid). Piecemeal implementation of individual projects may result in localized improvements; however, broader restoration and enhancement goals are less likely to be achieved than with an integrated approach. Short-term impacts would be minimized and mitigated according to applicable local, state, and federal environmental review and permit requirements.

4.9.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Individual water storage and fish enhancement projects would be implemented over a period of years to decades as part of a comprehensive, integrated set of actions. These actions are intended to provide overall benefits to fish and aquatic resources. Short-term impacts of the individual elements are described below. Avoidance and minimization measures would be identified and implemented consistent with federal environmental review and permitting requirements.

4.9.2.1 Fish Passage Element

Short-term impacts would be temporary and localized and could include dewatering of instream habitat, disturbance of juvenile salmonids, disturbance of shoreline habitat, increased water temperatures, sedimentation, fish passage obstruction, and potential for accidental spills of hazardous materials (i.e., cement, fuel, hydraulic fluid).

Construction of the fish passage facilities, which are intended to improve fish passage in the basin, may require temporary dewatering of stream channels. This could potentially have an adverse impact on fish habitat if not properly conducted. For example, fish in a dewatered stream section could die if not moved or could be harmed during removal. These types of projects would be subject to environmental review on an individual basis. In addition, if stream dewatering were required, fish would be removed from the stream section prior to dewatering in accordance with WDFW guidelines.

Construction could temporarily disturb habitats and shorelines where juvenile salmonids occur and could impact fish habitat in the short-term. These activities could require clearing along stream banks and grading of soils. Clearing of riparian vegetation could result in a reduction of stream shading that could increase stream temperature and decrease quality of shaded habitat used by fish.

Soils disturbed by grading could increase sedimentation and turbidity in the channel if not properly stabilized following the restoration activity. Sedimentation in fish-bearing streams is a concern because it can degrade fish spawning habitat, increase stream channel scour potential, foul rearing habitat, and alter the structure of riparian vegetation. Suspended sediment (turbidity) typically does not cause direct salmonid mortality unless extremely high levels occur (NOAA Fisheries, 1999). However, moderately increased turbidity and sedimentation may cause some downstream displacement of juvenile salmon because they instinctively avoid turbid water.

Although not likely, accidents such as spills of hazardous materials could occur that would degrade water quality and/or be toxic to fish.

4.9.2.2 Modifying Existing Structures and Facilities Element

Short-term impacts would be temporary and localized and could include those discussed in Section 4.9.2.1 for the fish passage element. Depending on the action, short-term impacts of modifying structures/operations would likely be less than for the fish passage element. Modifying structures/operations would entail changing the flow regime and would require less construction compared to the construction of new fish passage facilities.

4.9.2.3 New Storage Element

Short-term impacts would be temporary and localized and could include those discussed in Section 4.9.2.1. However, short-term impacts of the new storage element would likely be greater because there could be new construction and inundation of previously unimpounded areas of instream habitat.

In-channel projects that impound water in the existing channel can influence fish by:

- Restricting or adversely influencing upstream and downstream passage;
- Entraining or impinging juvenile species at points of diversion;
- Inundating channel habitat features that are important for spawning or rearing habitat;
- Altering water quantity (stream flow levels), flow rate, and water quality (temperature, dissolved oxygen, nutrients, pesticides, herbicides, suspended and bedload sediment levels) in the channel downstream of the reservoir; these changes could influence trophic relationships, shellfish beds, behavioral cues, and migratory timing of fish; and
- Partitioning stream habitat into flowing and impounded reaches, negatively influences habitat connectivity by disconnecting stream reaches.

4.9.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on fish and aquatic resources were described in Sections 5.8.2.4, 5.9.2.4, and 5.10.2.3 of the January 2008 Draft Planning Report/EIS.

4.9.2.5 Fish Habitat Enhancement Element

In addition to the impacts discussed in Section 4.9.2.1, disturbance of streambed materials could occur during the fish habitat enhancement projects. Disturbance of these materials might cause a decrease in prey production or otherwise influence fish to avoid these habitats in the short term. However, the goal is to provide streambeds more suitable for salmonid use over the long-term.

Short-term impacts of the fish habitat enhancement element are likely to be greater than the modifying structures/operations element, but similar to all the other elements. Habitat enhancement work would entail new construction along shorelines and in habitats where salmonids may be present.

4.9.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on fish and aquatic resources were described in Sections 5.8.2.2, 5.9.2.2, and 5.10.2.2 of the January 2008 Draft Planning Report/EIS.

4.9.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on fish and aquatic resources were described in Sections 5.8.2.3, 5.9.2.3, and 5.10.2.2 of the January 2008 Draft Planning Report/EIS.

4.9.3 Mitigation Measures

Appropriate mitigation measures would be identified through local, state, and federal environmental review and permitting processes and would therefore be project-specific. Typical mitigation measures for short-term impacts may include but not be limited to:

- Deploying silt screens,
- Using in-water containment screens to protect against accidental hazardous material spills,
- Working within appropriate instream fish work windows,
- Implementing native plant species revegetation/enhancement plans,
- Following a dewatering plan for constructability and sediment control, and
- Maintaining fish passage through work areas.

All of these measures are consistent with WDFW Stream Habitat Restoration guidelines (WDFW, 2004).

4.10 Recreational Resources

4.10.1 No Action Alternative

The No Action Alternative would not result in direct short-term recreational impacts in the Yakima River basin. However, some of the individual actions undertaken by various entities and agencies that are currently funded and have a schedule for implementation could result in temporary construction impacts due to access limitations. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the recreational resource impacts from construction would be prepared separately.

4.10.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Recreation activities that could be impacted include fishing, boating, camping, and wildlife viewing. Short-term impacts would be primarily related to construction activities that may result in temporary access restrictions or nuisance dust and noise. These elements are discussed in the following sections.

4.10.2.1 Fish Passage Element

Construction activities, heavy equipment, and temporary structures would be in evidence at varying intensities and durations during the construction period for individual projects. Access to and from some recreational facilities, such as parks, boat launches, trails, and campgrounds near the reservoirs, may be limited during this time. Construction for some elements, such as for the Cle Elum dam, could last several years. Fugitive dust and noise could also reduce the ability of users to enjoy recreational facilities near construction activities. Potential impacts to recreational resources associated with construction of fish passage facilities would be short-term, minor, localized, and temporary.

4.10.2.2 Modifying Existing Structures and Facilities Element

Modifications requiring construction activities would cause short-term impacts similar to those discussed above for the fish passage element. Construction activities for this element could, however, be larger in scale, such as for the lateral piping projects. Impacts to access at nearby recreational facilities could last longer, but would still be localized and temporary.

Operational modifications associated with construction activities would not likely have an impact on recreational resources in the Yakima River basin as no significant construction would be involved.

4.10.2.3 New Storage Element

Recreational impacts at Bumping Lake would be extensive during the construction period for either the large or small expansion options. Existing recreation facilities such as swimming, boating, fishing and camping would not be available during construction. In addition to the recreational facilities that would be eliminated by the expansion of Bumping Lake (described in Section 5.10.2.3), access to others would likely be limited during construction. This may include nearby campsites, trails and trailheads, and access to the lake itself. Indirect impacts to recreational facilities in the vicinity of Bumping Lake from construction activities would be short-term and temporary.

Short-term impacts to recreational facilities for other storage options would be similar to those for the Bumping Lake expansion, though not likely as extensive. There are currently no recreation opportunities at the potential Wymer Dam site. Short-term impacts to recreational facilities at all potential storage sites would be localized and temporary.

4.10.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on recreational resources were described in Section 5.12.2.3 of the January 2008 Draft Planning Report/EIS.

4.10.2.5 Fish Habitat Enhancement Element

The greatest temporary recreational resource impacts would result from construction of projects involving stream bank reshaping, channel reconstruction, and relocating and improving floodplain infrastructure and roads. These impacts are related to the intensity of construction activities and access limitations that would likely occur. The primary types of recreation affected would be streamside activities such as fishing and wildlife viewing. These construction impacts would be temporary in nature and localized to the vicinity of construction.

4.10.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on recreational resources were described in Section 5.12.2.1 of the January 2008 Draft Planning Report/EIS.

4.10.2.7 Market-based Reallocation of Water Resources

The impacts of the Ground Water Storage Element on recreational resources were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

4.10.3 Mitigation Measures

Access to and from recreational facilities may be temporarily closed, or limited, during construction. To the extent possible, alternate access routes would be provided. To minimize the negative impact to users, informational signage and alternate directions should be posted along access routes, at the recreational sites, and on agency websites.

Construction best management practices would be implemented to minimize the impact on recreation facilities and their patrons from nuisance dust and noise during temporary construction activities.

4.11 Land and Shoreline Use

4.11.1 No Action Alternative

The No Action Alternative would not result in direct short-term land use impacts in the Yakima River basin. Some of the other, currently funded actions undertaken by various entities and agencies, and that have a schedule for implementation, could result in temporary construction impacts due to access limitations. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the land and shoreline use impacts from construction would be prepared separately.

4.11.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Short-term impacts to land use would be primarily related to construction activities that may result in temporary access restrictions. These elements are discussed in the following sections.

4.11.2.1 Fish Passage Element

Construction activities, heavy equipment, and temporary structures could limit access to and from adjacent properties. Potential impacts to land use associated with the construction of fish passage facilities would be short-term, minor, localized, and temporary. Individual construction projects would be subject to the regulations and permitting requirements of the presiding jurisdiction, which may include NEPA and/or SEPA compliance, permits required under the Shoreline Management Act, and regional building permits.

4.11.2.2 Modifying Existing Structures and Facilities Element

Modifications requiring construction activities would cause short-term impacts similar to those discussed in Section 4.11.2.1, and would be subject to the same regulatory requirements. Construction activities for this element could, however, be larger in scale, such as for the lateral piping projects. Impacts to access to adjacent properties could last longer, but would still be temporary in nature.

Operational modifications associated with construction activities would not likely have an impact on land use in the Yakima River basin as no significant construction would be involved.

4.11.2.3 New Storage Element

Construction associated with the proposed Bumping Lake expansion would be extensive for either the large or small expansion option. In addition to the property that would be inundated by the expansion of Bumping Lake (described in Section 5.11.2.3), access to other property outside of the direct impact area would likely be limited during construction. However, this indirect impact to property access would be short-term.

Short-term impacts to land use for other storage options would be similar to those for the Bumping Lake expansion, though not likely as intense. Short-term land use impacts at all potential storage sites would be localized and temporary and would subject to the same regulatory requirements, as described in Section 4.11.2.1.

Currently, the proposed site of Pine Hollow reservoir is privately owned. As discussed in Section 5.7.2 of the Programmatic EIS for the Ahtanum Creek Watershed Restoration Program, property would have to be acquired by the implementing entity for the reservoir and appurtenant facilities. Land at the reservoir site would be permanently converted from its existing land uses (primarily residential and agricultural).

4.11.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on land and shoreline use were described in Section 5.13.2.3 of the January 2008 Draft Planning Report/EIS.

4.11.2.5 Fish Habitat Enhancement Element

Fish habitat enhancement projects could include reconnecting side channels, floodplains, and off-channel habitat to streams; restoring natural channels, riparian areas, and wet meadows; and relocating infrastructure. Enhancement-related construction activities would mostly include instream work, including the construction of fish passage facilities. Enhancements requiring construction activities would cause the same type of short-term impacts and be subject to the same regulatory requirements discussed in Section 4.11.2.1.

4.11.2.6 Enhanced Water Conservation Element

The impacts of the Ground Water Storage Element on land and shoreline use were described in Section 5.12.2.1 of the January 2008 Draft Planning Report/EIS.

4.11.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on land and shoreline use were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

4.11.3 Mitigation Measures

Access to and from adjacent property may be temporarily closed, or limited, during construction. Properties impacted would likely be a mix of public and private with a variety of land uses depending on the exact location of the projects. To the extent possible, alternate access routes would be provided, and access to private property would be maintained at all times. To minimize the negative impact, informational signage and alternate directions should be posted along access routes, at the construction sites, and on agency websites.

4.12 Cultural Resources

Short term impacts to cultural resources under these alternatives are defined as construction-related impacts. While these impacts would occur as a result of short-term construction activities, the impacts on cultural resources, or archaeological or historic sites would be permanent. Short term impacts to traditional cultural properties or sacred sites may be impermanent such as increased noise or construction activity, or permanent if a place is disturbed or inundated.

4.12.1 No Action Alternative

Short-term impacts to cultural resources are possible under the No Action Alternative, including impacts from ground disturbing activities associated with stream restoration, irrigation improvements, and structural improvements to historic structures. It is expected that these impacts would be addressed under separate environmental review processes regulating the individual actions proposed.

4.12.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

4.12.2.1 Fish Passage Element

Short-term impacts to cultural resources could include modification of historic dams and their appurtenances; while the actions would occur in the short term, these impacts would be permanent. Measures to avoid affecting cultural resources would be employed prior to construction to minimize these potential impacts.

4.12.2.2 Modifying Existing Structures and Facilities Element

Short-term impacts to cultural resources under this alternative would be similar to those described in Section 4.12.2.1.

4.12.2.3 New Storage Element

Construction of a storage facility could adversely impact cultural resources in the short term. Any ground disturbing activity, including removal of vegetation prior to inundation, earthmoving, and use of heavy equipment, could adversely affect cultural resources in the area of the construction activity as well as in staging areas and construction access areas. Other impacts could include removal of historic structures prior to inundation. These impacts would be permanent. Additionally, construction for new storage could adversely impact access to traditional cultural properties, traditional use areas, and sacred sites.

4.12.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on cultural resources were described in Section 5.20.2.3 of the January 2008 Draft Planning Report/EIS.

4.12.2.5 Fish Habitat Enhancement Element

Short-term impacts to cultural resources under this alternative would be similar to those described in Section 4.12.2.3, although the scale of the activities would be smaller.

4.12.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on cultural resources were described in Section 5.20.2.1 of the January 2008 Draft Planning Report/EIS.

4.12.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on cultural resources were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

4.12.3 Mitigation Measures

Under any of the alternatives, additional environmental review is expected to be conducted. Mitigation measures for the Integrated Water Resource Management Alternative would be similar to those described in Section 5.20.3 of the January 2008 Draft Planning Report/EIS.

4.13 Socioeconomics

Consistent with the approach used in Section 5.14 of the January 2008 Draft Planning Report/EIS, the assessment of short-term socioeconomic impacts and mitigation measures considers potential effects on the supply and value of goods and services derived from the basin's water and related resources, resource-related jobs and incomes, resource-related uncertainty and risk, the distribution of resource-related costs and benefits, and the structure of the economy.

4.13.1 No Action Alternative

Under this alternative, the current patterns and trends in the relationship between the basin's natural resources and the state's economy likely would continue over the short term. Over a short period of time, the overall changes in socioeconomic characteristics of the basin's water and related resources, and their interaction with the regional and statewide economies, likely would be negligible, unless the region experienced a catastrophic event, such as an extended drought period that wiped out economically important crops or fish populations. Section 5.14.1.1 of the January 2008 Draft Planning Report/EIS describes the socioeconomic characteristics that would be affected by the No Action Alternative. The No Action Alternative is expect to result in little or no change to these characteristics and would be similar to the impacts described in Section 5.14.1.1 of the January 2008 Draft Planning Report/EIS.

4.13.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Some of the individual elements of the Integrated Water Resource Management Alternative might have discernible short-term effects on the supply and value of some goods and services derived from the basin's water-related ecosystem. Project-related expenditures likely would have short-term impacts on jobs and incomes, and project-related activities might trigger short-term changes in uncertainty and risk. Short-term effects on the distribution of costs and benefits, and on economic structure, would likely depend on the mechanisms used to fund project-related activities. Detailed determination of potential effects would require site and project specific assessments for all elements of the Integrated Water Resource Management Alternative.

4.13.2.1 Socioeconomic Characteristics

Value of Goods and Services

All of the elements would require would require financial resources, volunteer resources, land, and other resources. These resources would not be available for use elsewhere. Short-term changes in other resource-related goods and services, if any, likely would not be discernible.

Jobs and Incomes

Short-term expenditures associated with elements of the Integrated Water Resource Management Alternative would likely generate jobs and incomes for some of the workers directly associated with these activities. The initial impacts would be dampened, however, to the extent that expenditures on these activities draw funding, labor, or other resources away from other activities.

Uncertainty and Risk

Projects proposed under the Integrated Water Resource Management Alternative would likely have little short-term effect on risk and uncertainty associated with the basin's water and related resources. The projects might have indirect effects, to the extent that a decision to proceed with a particular project would signal to private and public entities that specific investments will occur for a specific project and that the investments likely would alter the demand for and supply of related goods and services. Such signals might convince households and businesses that the risk and uncertainty associated with related investments have diminished, and induce them to make investments that otherwise would not occur.

Distribution of Costs and Benefits

In general, projects associated with the Integrated Water Resource Management Alternative would involve costs, concentrated in the short term, aimed at producing long-term benefits. Therefore, the short-term impacts on the distribution of costs and benefits would be determined by each project's impacts on its source of funding for the project, and on the types of land and other non-financial resources it would consume.

Socioeconomic Structure

The socioeconomic structure is not like to change in the short-term under the Integrated Water Resource Management Alternative.

4.13.2.2 Fish Passage Element

Value of Goods and Services

Impacts would be similar to those described in Section 4.13.2.1.

Jobs and Incomes

In its assessment of proposed fish passage expenditures at Cle Elum and Bumping Lake Dams, Reclamation (2008c) estimated that the projects would create local jobs at the rate of about one job per $64,000 to $66,000 of local construction expenditures. It also estimated that the local expenditure of $1 on construction would generate about $0.60 of local labor income. These estimates do not, however, account for second-order effects that could significantly reduce the overall impacts on jobs and income. Such effects would materialize, for example, if fish passage projects would secure the services of construction firms and workers only by attracting them away from other projects, so that the net short-term impact on the overall level of local construction would be smaller than the fish passage projects in isolation.

Uncertainty and Risk

Short-term impacts would be similar to those described in Section 4.13.2.1.

Distribution of Costs and Benefits

Short-term impacts would be similar to those described in Section 4.13.2.1.

Socioeconomic Structure

The fish passage element is not likely to change the socioeconomic structure in the short term.

4.13.2.3 Modifying Existing Structures and Facilities Element

Value of Goods and Services

Short-term impacts of this element of the Integrated Water Resource Management Alternative would be similar to Section 4.13.2.1.

Jobs and Incomes

Short-term impacts of modifying existing structures and facilities would be similar to those described in Section 4.13.2.1.

Uncertainty and Risk

Projects to modify existing structures and facilities likely would have similar short-term impacts to those described in Section 4.13.2.1.

Distribution of Costs and Benefits

Short-term impacts of this element of the Water Resources Management Alternative to the distribution of costs and benefits would be similar to those described in Section 4.13.2.1.

Socioeconomic Structure

The socioeconomic structure is not likely to change in the short term under this element of the Integrated Water Resource Management Alternative.

4.13.2.4 New Storage Element

Value of Goods and Services

The short-term impacts to the value of goods and services under this element of the Water Resources Management Alternative would be similar to those described in Section 4.13.2.1.

Jobs and Incomes

The short-term impacts on jobs and incomes per unit of expenditure likely would resemble those for expenditures on fish passage activities, described in Section 4.13.2.1, or those described in Section 4.14.2.4 of the January 2008 Draft Planning Report/EIS, to the extent that a specific project to develop new storage would have similar scope and labor requirements.

Uncertainty and Risk

Projects to develop new storage likely would have little short-term effect on risk and uncertainty associated with the basin's water and related resources similar to those described in Section 4.13.2.1.

Distribution of Costs and Benefits

In general, projects to develop new storage would involve costs, concentrated in the short term, aimed at producing long-term benefits. Therefore, the short-term impacts on the distribution of costs and benefits would be determined by each project's impacts on its source of funding for the project, and on the types of land and other non-financial resources it would consume.

Socioeconomic Structure

The socioeconomic structure is not likely to change in the short term under the new storage element of the Integrated Water Resource Management Alternative.

4.13.2.5 Ground Water Storage Element

The impacts of the Ground Water Storage Element on socioeconomics were described in Section 5.14.2.3 of the January 2008 Draft Planning Report/EIS.

4.13.2.6 Fish Habitat Enhancement Element

Value of Goods and Services

Short-term impacts of this element on the value of goods and services would be similar to those described in Section 4.13.2.1.

Jobs and Incomes

Short-term impacts on jobs and incomes associated with the fish habitat enhancement would be similar to those described in Section 4.13.2.1.

Uncertainty and Risk

Projects to enhance fish habitat likely would have little short-term effect on uncertainty and risk similar to those described in Section 4.13.2.1.

Distribution of Costs and Benefits

Short-term impacts to the distribution of costs and benefits under the fish habitat enhancement element would be similar to those described in Section 4.13.2.1.

Socioeconomic Structure

The socioeconomic structure is not likely to change in the short term under the fish habitat enhancement element of the Integrated Water Resource Management Alternative.

4.13.2.7 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on socioeconomics were described in Section 5.14.2.1 of the January 2008 Draft Planning Report/EIS.

4.13.2.8 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on socioeconomics were described in Section 5.14.2.2 of the January 2008 Draft Planning Report/EIS.

4.13.3 Mitigation Measures

The type and level of mitigation, if any, that would be appropriate for adverse, short-term socioeconomic impacts would be determined by future socioeconomic conditions and by the specific steps that would be taken to implement the projects. Mitigation typically would be warranted only insofar as projects would reduce the supply of one set of goods and services—to increase the supply of another—and the reduction would harm one or more individuals, businesses, landowners, or other interest group. For example, mitigation might involve compensation, by providing unemployment benefits if the fallowing of land to enhance fish habitat were to cause farm workers to lose their jobs.

4.14 Visual Resources

4.14.1 No Action Alternative

The No Action Alternative would not result in direct visual resource impacts in the Yakima River basin. Some of the individual actions undertaken by various entities and agencies that are currently funded and have a schedule for implementation could require construction, resulting in visual resource impacts. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the visual resource impacts from construction would be prepared separately.

4.14.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

4.14.2.1 Fish Passage Element

Construction activities, fugitive dust, heavy equipment, cofferdams, and other temporary structures would be in evidence at varying intensities and durations during the construction period for individual projects. Views of the construction sites would generally create an unattractive visual setting during the construction period. Viewpoints are generally limited to local roads and public access areas along the rivers and reservoirs. Some nearby residences may also have views of the construction. Potential visual impacts associated with construction of fish passage facilities would be short-term, minor, localized, and temporary.

4.14.2.2 Modifying Existing Structures and Facilities Element

Modifications to spill gates, fish bypass systems, and canals would create short-term, minor, localized, and temporary visual impacts during the construction period of individual projects. Because access to and views of these facilities are limited, few people would notice the construction.

4.14.2.3 New Storage Element

Visual impacts during construction of new storage facilities would be extensive during the construction period. Construction would require clearing, stump removal and grading of the reservoir area, and construction of an earth-fill or other dam. All of these activities would change existing landscapes, possibly block existing views, and create an unattractive visual setting. These activities could last several years. The extent of impacts would depend on how visible the construction site would be to the public.

Because of Bumping Lake's location in a popular recreation area, visual impacts during construction could be significant. Viewpoints around the reservoir construction area would primarily be from U.S. Forest Service roads and trails in the William O. Douglas Wilderness Area. Seasonal residences and recreation facilities along the existing reservoir would be removed and unavailable during construction (see Section 5.11.2.3 for information on residences). Impacts associated with the proposed Pine Hollow reservoir were described in the 2005 EIS on the Ahtanum Creek Watershed Restoration Program (Ecology, 2005a). Impacts associated with Pine Hollow are expected to be relatively minor because of the limited number of people who view the site and the lack of uniqueness associated with the scenic resource.

Construction activities associated with modifications to the KRD Main Canal and South Branch Canal, the new canal from Cle Elum Dam to the KRD Main Canal, and tunneling through Manastash Ridge could be visible from interstates (I-90 and I-82), local roads, residences, and recreational areas. These impacts would be of limited duration.

4.14.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on visual resources were described in Section 5.19.2.3 of the January 2008 Draft Planning Report/EIS.

4.14.2.5 Fish Habitat Enhancement Element

Construction of projects involving stream bank reshaping, channel reconstruction, and restoring fish passage at manmade barriers would have the greatest temporary visual impacts of the fish habitat enhancement projects. Potential impacts would be related to the intensity of construction activities, presence of heavy equipment, and temporary impacts to vegetation. Construction areas could be visible from adjacent roadways and by boaters on the rivers. Visual impacts would be temporary.

4.14.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on visual resources were described in Section 5.19.2.1 of the January 2008 Draft Planning Report/EIS.

4.14.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on visual resources were described in Section 5.19.2.2 of the January 2008 Draft Planning Report/EIS.

4.14.3 Mitigation Measures

Specific mitigation measures would be developed for individual construction projects. The projects would comply with dust control requirements of the Yakima Regional Clean Air Authority.

4.15 Transportation

4.15.1 No Action Alternative

The No Action Alternative would not result in direct short-term transportation impacts in the Yakima River basin. Some of the other, currently funded actions undertaken by various entities and agencies, and that have a schedule for implementation, could result in temporary construction impacts. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of transportation impacts from construction would be prepared separately.

4.15.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

4.15.2.1 Fish Passage Element

The construction of the various fish passage elements could have minor, short-term impacts on highways in the Yakima River basin. There would be increased traffic on roadways with worker traffic, equipment, and deliveries. All the fish passage facilities would be located in areas served by local roads and Reclamation access roads with limited traffic. Only minor short-term impacts are anticipated. No roadways would be closed by the construction projects.

4.15.2.2 Modifying Existing Structures and Facilities Element

The construction of the various structural changes to existing facilities could have minor, short-term impacts on highways in the Yakima River basin. Where canals or other delivery systems are located adjacent to roadways, there could be temporary disruptions of traffic. Piping of canals could require that culverts be installed or replaced under roadways. There would be increased traffic on roadways with worker traffic, equipment, and deliveries. The degree of impact depends, in part, on the current level of service on potentially affected roads.

4.15.2.3 New Storage Element

Construction of new storage facilities would likely have the greatest short-term impact to transportation. Construction would cause increased traffic on roadways with worker traffic and equipment and materials hauling. Construction at Bumping Lake could have minor, short-term impacts on SR-410 and National Forest Development Road 1800. Construction of the new Pine Hollow reservoir could have minor, short-term impacts on Ahtanum Road and local access roads. The major impact would be increased traffic on the roadways. Construction at Bumping Lake could cause road closures during the construction period, which could last several years.

4.15.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on transportation were described in Section 5.16.2.3 of the January 2008 Draft Planning Report/EIS.

4.15.2.5 Fish Habitat Enhancement Element

The construction of the various fish habitat enhancement elements could have minor, short-term impacts on highways in the Yakima River basin. There would be increased traffic on roadways with worker traffic, equipment, and deliveries. The degree of impact depends, in part, on the current level of service on potentially affected roads. Only minor short-term impacts are anticipated.

4.15.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on transportation were described in Section 5.16.2.1 of the January 2008 Draft Planning Report/EIS.

4.15.2.7 Market-based Reallocation of Water Resources

The impacts of the Market-based Reallocation of Water Resources Element on transportation were described in Section 5.16.2.2 of the January 2008 Draft Planning Report/EIS.

4.15.3 Mitigation Measures

Mitigation measures to reduce short-term construction impacts to transportation would include maintaining access to properties, installing signage, marking detour routes, and providing information to the public.

CHAPTER 5.0 LONG-TERM IMPACTS AND MITIGATION MEASURES

This chapter describes the long-term impacts that could result from the alternatives proposed in this Supplemental Draft EIS. Long-term impacts are those that would occur as a result of implementing the selected alternatives. Possible mitigation measures for the impacts are also discussed. Because this is a Programmatic EIS and the details of project implementation are not known, long-term impacts are discussed in general terms. Specific projects may be required to undergo additional environmental review to identify specific long-term impacts.

Impacts are evaluated for both the No Action Alternative and the Integrated Water Resource Management Alternative. The Integrated Water Resource Management Alternative includes seven elements—fish passage, modifying existing structures and facilities, new storage, ground water storage, fish habitat enhancement, enhanced water conservation, and market-based reallocation of water resources. Impacts associated with the elements are presented individually first. Because Ecology intends that the Integrated Water Resource Management Alternative would be implemented as a combined package, the impacts of integrating the elements are also presented. Long-term cumulative impacts are presented at the end of this chapter.

5.1 Earth

5.1.1 No Action Alternative

Under the No Action Alternative, the existing activities, development patterns, and land use trends in the Yakima River basin would continue. Erosion and sediment delivery to streams likely would continue to occur at about the same rates as under existing conditions or could increase in the future, as past trends have indicated. Any projects undertaken by other agencies or individuals would undergo separate NEPA or SEPA evaluation, as appropriate, to determine impacts to earth resources.

5.1.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.1.2.1 Fish Passage Element

No major long-term earth impacts are expected from the fish passage element. Some of the fish passage structures would likely provide a limited source of organic materials for downstream beds, banks, and vegetation. Site scale stream channel erosion and channel modification are also possible.

5.1.2.2 Modifying Existing Structures and Facilities Element

Earth-related impacts are expected to be minimal during operation of the modified facilities after construction activities have been completed, with the possible exception of erosion and shoreline changes to existing reservoirs that are currently operated at different pool levels.

5.1.2.3 New Storage Element

The new storage facilities element has the greatest potential to cause impacts to earth resources over the long term. Storage facilities, including the expansion of Bumping Lake, have the potential to alter the transport of upstream sediments, resulting in increased deposition in the reservoir and reduced sediment loads to downstream waters. The flushing of deposited sediment on reservoir beds could potentially deliver sediment to receiving waters over more concentrated time periods. Seepage at the downstream face of a dam or embankment could increase slope instability, erosion, or mass failure. No landslide masses or potential unstable masses were identified at Bumping Lake during previous preliminary geologic investigations (Reclamation, 1979). Detailed earth-related impacts for storage facilities would be described in future site-specific geologic investigations.

5.1.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on sediment resources were described in Section 5.5.2.3 of the January 2008 Draft Planning Report/EIS. The impacts to earth under the ground water storage element vary depending on the ground water storage approach that is implemented. Surface recharge will have different impacts than direct injection.

Surface recharge requires development of ponds that are 2 to 5 feet deep and possibly upgrading canals or developing new transmission infrastructure. The total land area needed for the surface recharge sites could range between 166 and 500 acres for similar infiltration capacities, with an expected area of about 300 acres (Ecology, 2009a). Construction of surface recharge ponds would require earth removal for that amount of area. Operation of the ponds also requires removal of vegetation and scraping to remove or break-up the clogging layer. Development of transmission infrastructure would disturb earth resources during construction but there would be a minimal impact during operation.

Direct injection will require the construction of transmission infrastructure, treatment plants or river bank filtration wells, and injection and recovery wells. Development of transmission infrastructure would disturb earth resources during construction but there would be a minimal impact during operation. Construction of new treatment plants will disturb land for the new building. Construction of wells for river bank filtration, injection, and recovery will have a small amount of ground disturbance during drilling and well development.

Detailed earth-related impacts for all ground water storage projects would be described in future site-specific geologic investigations.

5.1.2.5 Fish Habitat Enhancement Element

Restoring natural functions to riparian areas and streams would stabilize floodplain function and potentially reduce bank erosion and sedimentation to streams. Changing development patterns on frequently flooded areas could restrict earth-moving and disturbance activities within these areas, lessening the sedimentation caused during periodic inundation.

5.1.2.6 Enhanced Water Conservation Element

The Enhanced Water Conservation Element is expected to have similar earth impacts as the No Action Alternative. This alternative would involve changes in conservation practices by state entities, irrigation districts, and end users, as well as physical changes to some infrastructures elements, such as lining of irrigation ditches. Minimal landscape changes from facility upgrades and piping projects could result in localized soil instability, but would be evaluated in subsequent site-specific investigations. Increased flows in some reaches of the Yakima River would increase transport of sand size material, but channel morphology would not be impacted. If conservation results in reduced return flows from irrigated areas, sediment transport to streams through irrigation drains could be reduced.

5.1.2.7 Market-based Reallocation of Water Resources

The Market-based Reallocation of Water Resources would have similar channel morphology impacts as the No Action Alternative. Reallocation of water resources through water transfers or water banking could potentially cause changes in land use from irrigated cropland to less water intensive crops, fallowed land, or urban uses. Those land use changes could result in changes in erosion and sediment delivery to streams. Reduced soil erosion could occur if source areas are converted to dryland crops or fallowed land, or if areas are paved or landscaped for urban uses.

5.1.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Implementing the elements under the Integrated Water Resource Management Alternative as an integrated package would result in a combination of effects including loss of earth-related resources, permanent landscape modifications, new roads, and changes in stream channel and floodplain conditions. These effects are not expected to be greater than if the elements or projects were implemented individually, and could result in lower impacts associated with coordinated implementation. Increased coordination of project elements could help minimize overall impacts by enhancing efficiency in design and construction, and monitoring of projects.

5.1.4 Mitigation Measures

Mitigation measures to reduce sedimentation could be accomplished through roadway design, stream buffers, and compliance with state stormwater requirements. As discussed in Section 4.1.3, site-specific geotechnical studies would identify subsurface issues and would help design projects to minimize risks associated with potential or actual geologic instabilities. Dam safety inspections and monitoring of slopes and hydrostatic pressures would help document management strategies that are effective and identify any needed changes to management strategies. Managing recharge volumes and pressures in groundwater storage aquifers to limit seepage, inventorying slopes in the project area, and monitoring pressures in slope areas during recharge and storage would minimize potential slope instability. Additional mitigation measures for potential earth impacts were described in Section 5.5.2.4 of the January 2008 Draft Planning Report/EIS.

5.2 Climate Change

For purposes of this Supplemental Draft EIS, the effect of climate change on proposed projects discussed as a long-term impact. The potential of proposed projects to generate greenhouse gas emissions were discussed as a short-term impact in Section 4.2.

5.2.1 No Action Alternative

Changes in precipitation, snowmelt, and runoff that are likely to occur as a result of climate change could affect projects included in the No Action Alternative. There may be changes in water availability for irrigation, fish, and municipal uses, as discussed in Section 3.2. Without a comprehensive, integrated management program, projects would be completed in a piecemeal fashion, reducing the potential for coordination and efficiencies in implementation. An uncoordinated approach may reduce the potential to adapt water management strategies and adjust to changing climatic conditions.

5.2.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

As discussed in Section 3.2, the effects of climate change could alter temperature and precipitation in the Yakima River basin and affect water management throughout the region. Changes in runoff and precipitation would require Ecology, Reclamation, and other agencies to adapt water management to respond to changing conditions as they occur.

Improvements to storage, water supply, and fish habitat that are proposed under the Integrated Water Resource Management Alternative may improve the ability of water agencies, the agriculture sector of the economy, and fish and wildlife to withstand and adapt to changing conditions. How each element of the Integrated Water Resource Management Alternative affects fish and the ability to adapt are presented below.

5.2.2.1 Fish Passage Element

The fish passage element would expand the territory available to anadromous salmonids by opening up habitat in higher mountain areas. The cooler streams in these areas may provide salmonids with habitat that helps them withstand changing climate conditions.

5.2.2.2 Modifying Existing Structures and Facilities Element

Modifying existing structures and facilities would allow the Yakima Project to be operated in a more efficient manner that would improve irrigation deliveries and reduce impacts to fish. These improvements could improve the adaptability of the system to future climate changes.

5.2.2.3 New Storage Element

Providing additional storage in the Yakima River basin is expected to improve irrigation deliveries and stream flows. These improvements could improve the adaptability of the system to future climate changes by providing a more reliable water supply for proratable irrigation districts and improving stream flows for fish.

5.2.2.4 Ground Water Storage Element

As described in Sections 5.2.3.3, 5.8.2.4 and 5.9.2.4 of the January 2008 Draft Planning Report/EIS, ground water storage could improve to streamflow, improve water supplies, and provide beneficial impacts to aquatic organisms. Ground water storage could be used to store the higher winter flows and released to offset some of the lower summer flows predicted under climate change scenarios. Ground water storage could provide a reliable supply of water for municipalities and residential developments. Stored ground water that returns to surface water through seeps would provide a source of cooler water to benefit fish and other organisms. These benefits would likely be localized, but would improve the ability to adapt to climate change.

5.2.2.5 Fish Habitat Enhancement Element

Fish habitat enhancements would create a healthier habitat for fish in the Yakima River basin by reconnecting and re-establishing floodplains and side channels, enhancing and restoring riparian habitat conditions, and increasing channel complexity. This should improve the growth, survival, and abundance of both anadromous and resident fish and help the populations withstand the impacts of climate change.

5.2.2.6 Enhanced Water Conservation Element

The effects of the Enhanced Water Conservation Element on water resources and anadromous and resident fish were described in the January 2008 Draft Planning Report/EIS Sections 5.2.3.1, 5.8.2.1, and 5.9.2.1 respectively. The expected small improvements in streamflow that would result from Enhanced Water Conservation could improve the ability to adapt to climate change.

5.2.2.7 Market-based Reallocation of Water Resources Element

Sections 5.2.3.1, 5.8.2.3, and 5.9.2.3 of the January 2008 Draft Planning Report/EIS describe how Market-based Reallocation of Water Resources could provide benefits to water supply, stream flows and anadromous and resident fish. A market-based reallocation system could improve the flexibility to adapt to climate change by allocating water where it is needed to improve water supplies, stream flows, and conditions for fish.

5.2.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

The Integrated Water Resource Management Alternative would not increase emissions in the long term that would exacerbate climate change. There would be minor increases in vehicle emissions caused by trips to service new facilities.

As an integrated package, this Alternative would provide multiple benefits to water supply, agriculture and fish while improving the ability of water managers to adapt to future climate changes. Approaching management on a basin-wide level could provide additional consistency in water management. Additional water storage and improved irrigation operations would provide a more reliable water supply for agriculture during dry periods. Improved stream flows and fish habitat, along with access to upper river tributaries, would produce healthier fish populations that would be better able to withstand habitat changes caused by climate change. This Alternative embodies many of the methods for adapting to the adverse effects of climate change that are recommended in the University of Washington Climate Impacts Group and University of Oregon studies discussed in Section 3.2.

5.2.4 Mitigation Measures

Changes in water availability in the Yakima River basin will require the managing agencies to adaptively manage the river to respond to changing conditions. Ecology and Reclamation will coordinate with other water, fish, agriculture, energy, forest and public health managers to adapt to climate change.

5.3 Surface Water

5.3.1 No Action Alternative

The No Action Alternative includes conservation measures through YRBWEP (described in Section 2.2.1) that may impact surface water. These impacts could include a slight increase in TWSA and stream flow in various Yakima River reaches and tributaries. The surface water impacts are similar to those listed in Section 4.2.2.1 in the Draft Planning Report/EIS, although benefits would be less than those listed.

5.3.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.3.2.1 Fish Passage Element

Surface water resources are not expected to be impacted in the long term from implementation of the fish passage element assuming the Yakima Project reservoirs will be operated in the same general manner as they are currently. Some slight modifications to storage fills and releases may be required to accommodate upstream or downstream passage; however, the schedule of deliveries should not change.

5.3.2.2 Modifying Existing Structures and Facilities Element

Operational Changes at Existing Facilities

Subordination of Roza Power Plant diversions from April to June would affect surface water. This element would allow water to remain in the middle Yakima River reach between Roza Canal and the Roza Power Plant return from April to June, the time of spring out-migration of juvenile salmonids. The amount of flow that would remain in the Yakima River is not yet determined, but recommendations for flow subordination would likely be provided by an adaptive management team each spring. The management team would consist of representatives from Reclamation, the Yakama Nation, major irrigators, and fish agencies. Reclamation would then be responsible for implementing the flow changes.

Subordination of Chandler Power Plant diversion during the spring (April to June) would affect surface water. This element would allow additional water to remain in the lower Yakima River reach between the Prosser Diversion Dam and the Chandler Canal return when flow in the Yakima River below Prosser Diversion Dam is below a flow threshold that is yet to be determined. The amount of flow required below Prosser Diversion Dam from April through June is currently set at 1,000 cfs. The flow increase has not yet been determined and recommendations would be provided each spring by an adaptive management team as described above for the Roza Power Plant subordination.

Structural Changes to Existing Facilities

The Wapato Irrigation Project (WIP) improvements would add a pump station near Granger to pump flow from the Yakima River to the Satus Unit. This project would affect surface water by allowing water normally diverted at Wapato Diversion Dam for the Satus Unit to remain in the Yakima River to the pump station. This element would decrease flow in the WIP canal and increase spring and summer flows in the middle Yakima River reach between Wapato Diversion Dam and the location of the pump station. The estimated increase in flow is 50 cfs.

Changes to the Chandler juvenile fish bypass outfall are not expected to cause long-term impacts to surface water.

The KID Pump Exchange Project would affect surface water by increasing flows in the Yakima River from Prosser Dam to its mouth. An increase in flow of 411 cfs in the 11-mile reach of the Yakima River would occur from Prosser Dam to the Chandler Power and Pumping Plant. The Columbia Irrigation District (CID) would continue to divert 45 cfs from Wanawish Dam and the total improvement in flow in the Yakima River downstream of the CID diversion would be 138 cfs. That accounts for the 207 cfs flow returned to the Yakima River from the hydraulic pumps at the Chandler Power and Pumping Plant. The remainder of KID's supply would be pumped from the Columbia River at Kennewick.

The effect of the KID pump exchange project was analyzed in the Enhanced Water Conservation Element using Reclamation's hydrologic model. The results are described in Section 5.2.3.1 of the January 2008 Draft Planning Report/EIS.

KRD Canal Modifications to Improve Tributary Flows

The Main Canal and South Branch Canal of the Kittitas Reclamation District (KRD) can be used to supply water to enhance the flows of Yakima River tributaries, specifically Big Creek, Little Creek, Taneum Creek, and Manastash Creek. KRD currently spills water to enhance flows at these tributaries. During peak times, however, the KRD canals are limited in capacity, and this water may not be available to spill. This element would free up capacity in the KRD system and allow additional flow enhancement for these tributaries.

Lateral Piping Projects along the Main Canal and South Branch Canal

Piping laterals off the Main Canal and South Branch Canal of the KRD would save water typically lost to conveyance and operation. Previous studies determined that 30 percent of water is lost to the KRD system. This value results in an average of 1.68 acre-feet of water lost per acre annually (CH2M Hill, 1999). This value accounts for all conveyance losses from the diversion to the turnout, so the Main Canal and South Branch Canal would have to be piped in addition to the laterals in order to save the full 1.68 acre-feet of water lost per acre annually. Based on limited lateral loss data received from KRD, the high loss laterals lose approximately 1.20 acre-feet of water per acre served annually.

Using this loss per acre and the acreage served by each lateral proposed to be improved, a total savings amount can be estimated. Table 5-1 lists the estimated savings by lateral.

Table 5-1 Estimated Water Diversion Reductions from KRD Lateral Improvements

Lateral	Acreage Served (acres)	Estimated Reduction (acre-feet/year)	Average Flow Reduction (cfs)
MC 4.9	142	170	0.48
MC 6.1	307	368	1.03
MC 7.7	208	250	0.70
MC 13.6	602	722	2.03
MC 16.9	50	60	0.17
Main Canal Total	**1,309**	**1,571**	**4.41**
SB 9.9	804	965	2.71
SB 13.8	1,064	1,277	3.58
SB 14.3	577	692	1.94
SB 16.7	416	499	1.40
SB 17.6	257	308	0.86
South Branch Total	**3,118**	**3,742**	**10.50**
Improvements Total	***4,427***	***5,312***	***14.90***

Sources: Satnik, 2008; CH2M Hill, 1999

This water diversion reduction from lateral improvements represents available capacity in the KRD Main Canal and South Branch Canal which can be used to supplement flow or supply water users in the tributaries within the KRD system, namely Big Creek, Little Creek, Taneum Creek, and Manastash Creek.

Big Creek and Little Creek are located on the Main Canal reach of the KRD. If the savings from the Main Canal lateral improvements are used solely to supplement flow or supply water users, an additional 1,570 acre-feet would be available for Big and Little Creeks, an average of 4.4 cfs over a six-month irrigation season. The total surface water right allotments on Big and Little Creeks are 1,950 acre-feet, so the water savings from Main Canal laterals can replace 80percent of the water used in diversions from Big and Little Creeks (CH2M Hill, 2001). Actual distributions of flow to Big and Little Creeks would be determined by an adaptive management team.

Taneum and Manastash Creeks are located in the South Branch Canal area of the KRD. If the savings from the South Branch Canal lateral improvements are used solely to supplement flow or supply water users, an additional 3,740 acre-feet would be available for Taneum and Manastash Creeks, an average of 10.5 cfs over a six-month irrigation season. The total surface water right allotments of Taneum and Manastash Creeks are 37,780 acre-feet, so the water savings from South Branch Canal laterals can replace 9.9 percent of the water used in diversions from Taneum and Manastash Creeks (CH2M Hill, 2001). Actual distributions of flow to Taneum Creek and Manastash Creek would be determined by an adaptive management team as described for Operational Changes at Existing Facilities above.

KRD Pumping Near End of Canal

Pumping from the Yakima River to the lower portion of the KRD system would free capacity in the Main Canal and South Branch Canal in the amount that is replaced. Table 5-2 lists the proposed lateral canals (laterals) that the Yakima River pumping would replace and the estimated average flow rate freed by this option.

Table 5-2 Results of Yakima River Pumping to Lower Portion of KRD System

Lateral	Acreage Served (acres)	Estimated Capacity Freed (cfs)
SB 14.3	577	11.5
SB 16.7	416	8.3
SB 17.6	257	5.1
Total	**1,250**	**25.0**

Sources: Satnik, 2008; CH2M Hill, 1999

The estimated capacity freed is based on the assumption that 0.02 cfs per acre is being distributed on average to water users (CH2M Hill, 1999).

This freed capacity can be used to divert water going through the KRD system that normally supplies irrigators on the laterals shown in Table 5-2 to Big, Little, Taneum, and/or Manastash Creeks. Approximately 7,000 acre-feet of water per year would be available for tributary enhancement. This volume is based upon average diversion rates for KRD (CH2M Hill, 1999).

Alternatively, the pumped water could be supplied directly to Manastash Creek water users allowing additional flow to remain in that creek during periods of low stream flow which occur from July to the end of the irrigation season. The pump station could be located at Riverbottom Road or on the west side of Manastash Creek near the Packwood Canal.

Complete the Wapatox Project

As described in Section 2.3.1.2 of the January 2008 Draft Planning Report/EIS, completing the Wapatox Project would increase flow in the Naches River between RM 17.1 (the current diversion location of the Wapatox Canal) and RM 9.7 (the current return location of the Wapatox Canal) by approximately 370 cfs on average. If the Naches-Selah Irrigation District diversion location is moved to the Wapatox Canal diversion location, an additional 100 cfs remains in the Naches River from RM 18.4 (the current diversion location of the Naches-Selah Irrigation District) to RM 17.1 (the proposed diversion location of the Naches-Selah Irrigation District). Other surface water bodies are not expected to be impacted by this project.

Summary of Impacts

A qualitative analysis of impacts to flows was made for the group of projects in this element of the Integrated Water Resources Management Alternative. The qualitative analysis illustrates the potential benefit to the flow regime for winter, spring, and summer flows in the reaches of the Yakima River, Naches River, and tributaries described in Chapter 3. The benefit to the flow regime may be increased or decreased flow in a reach or tributary during a particular season. The magnitude of that increase or decrease relative to a flow regime that more closely resembles the natural hydrograph was qualitatively assessed and described as having no benefit or having a low, medium, or high benefit. The benefits are illustrated in Table 5-3.

Table 5-3 Summary of Impacts to Flow by Modifying Existing Structures & Operations Element (includes Chandler, Roza, WIP Pump Station, KRD Feed to Creeks, Wapatox) – Upper, Middle, and Lower Yakima River

	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
Season	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Winter (Oct-March)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spring (April-June)	○	○	○	○	○	◒	◒	○	○	○	○	○	◒	◒	○	○
Summer (July-Sept)	○	○	○	○	○	●	●	○	○	○	○	○	●	●	○	○

	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
Season	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Winter (Oct-March)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spring (April-June)	●	○	○	○	○	○	◒	○	●	○	○	○	·	·	○	○	○	●	○
Summer (July-Sept)	○	○	○	○	○	○	●	○	○	○	○	○	◒	◒	○	○	○	○	○

Symbol	
●	High Benefit
◒	Medium Benefit
·	Low Benefit
○	No Change or Benefit

5.3.2.3 New Storage Element

Naches River Storage Reservoirs

Bumping Lake Expansion – Large Option

Reservoir Storage Capacity

The Bumping Lake Expansion – Large Option would change the storage capacity for Bumping Lake from 33,700 acre-feet to 458,000 acre-feet. Of this additional 424,300 acre-feet, this analysis assumes that 100,000 acre-feet would be used to enhance proratable water supplies during dry years and the remainder would be used for fish enhancement purposes. Examples of fish enhancement purposes include providing additional flow in the Yakima, Cle Elum, and Naches Rivers in spring months; providing pulse flow in those same rivers as desired; and increasing flow in the Yakima River in summer months downstream of the Sunnyside Canal diversion, mostly in drought years. The specific uses for the additional storage water would be dependent on flow and water supply conditions and would be determined by a management team consisting of representatives from Reclamation, the Yakama Nation, major irrigators, and fish agencies.

Table 5-4 describes the water storage capacity in reservoirs before and after the large option of the Bumping Lake enlargement is complete.

Table 5-4 Water Storage Capacity in Yakima Project Reservoirs – Large Option

Storage Location (Reservoirs)	Before Enlargement (acre-feet)	After Enlargement (acre-feet)
Upper Yakima (Keechelus, Kachess, Cle Elum)	833,700	833,700
Naches Arm (Bumping, Rimrock, Clear Creek)	237,000	661,300
Total	**1,070,700**	**1,495,000**

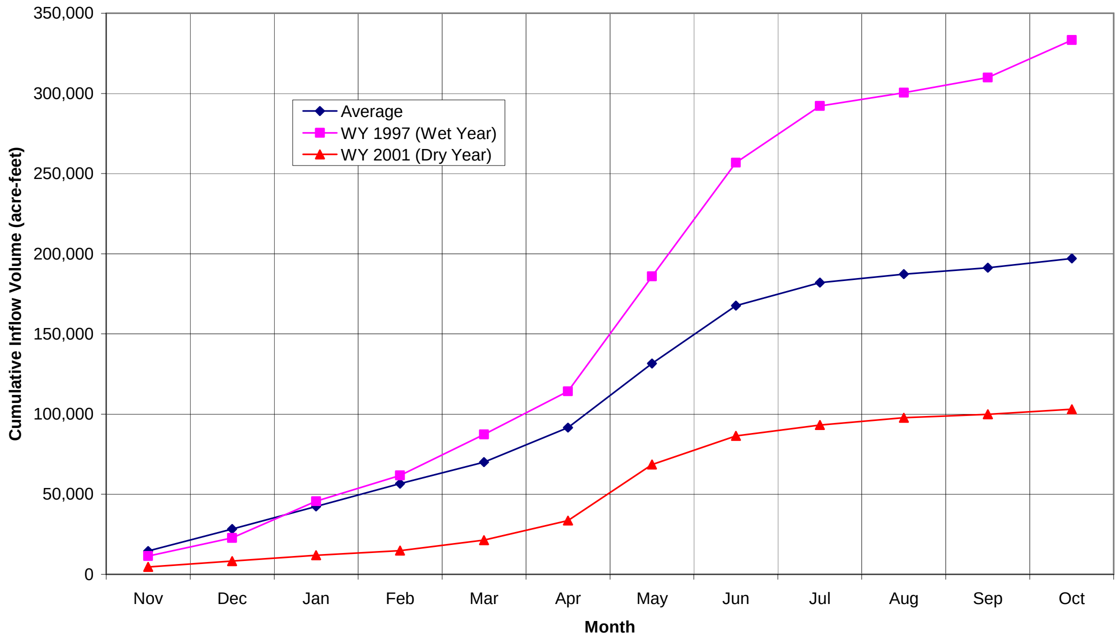
Volume of Flow into Bumping Lake

Reclamation collects real-time data from gages on Bumping Lake and the Bumping River to measure the volume of flow coming into Bumping Lake. An average of 196,900 acre-feet flowed into the lake annually from 1981 to 2005. The year of greatest flow into Bumping Lake during this period was 1997, when 332,700 acre-feet flowed into the lake. The year of least flow into the lake during this period was 2001, when 103,200 acre-feet flowed into Bumping Lake (Reclamation, 2008f).

These values are similar to ones presented in the 1976 Joint Feasibility Report for Bumping Lake Enlargement (Reclamation and USFWS, 1976). The 1976 report collected runoff data from 1926 to 1973, when an average runoff was determined to be 213,000 acre-feet. The maximum runoff year was 1956 with 326,500 acre-feet, and the minimum runoff year was 1941 with 110,000 acre-feet (Reclamation and USFWS, 1976).

Figure 5-1 shows a comparison between the average volume, the 2001 volume, and the 1997 volume.

Figure 5-1 Annual Volume of Flow into Bumping Lake, 1981-2005



Reservoir Operations

Reclamation's 2006 Appraisal Assessment

In the 2006 Appraisal Assessment, Reclamation proposed the enlargement of Bumping Lake to provide additional storage space within the Yakima Project (Reclamation, 2006). Reclamation assumed that the additional water would be used to increase the total water supply available (TWSA) and improve the ability to meet the Title XII (YRBWEP) flows required at Parker. Under that management scenario, Bumping River would shift further away from the natural (unregulated) hydrograph, which was considered unacceptable. Therefore, Bumping Lake expansion was removed from further consideration at that time (Reclamation, 2006).

Integrated Water Resource Management Alternative

The proposal in this EIS differs from the proposal in Reclamation's 2006 Appraisal Assessment. The increased capacity in Bumping Lake would increase the water storage capacity, but the additional storage water would be kept separate from the TWSA. Instead, 100,000 acre-feet of the additional storage water would be provided to irrigation districts with proratable water rights, which provide a portion of the funding for the project. The districts would use the water in drought years. Roza Irrigation District (Roza) and Kittitas Reclamation District (KRD) have expressed interest in this process. The Yakama Nation may also participate through the Wapato Irrigation Project or other out-of-stream uses. This water would not be used to increase the entitlement for the irrigation district(s); instead, it would be used to increase the proration percentage for the district(s) during drought years. As stated in Table 2-3 in Section 2.2.1.2 of the January

2008 Draft Planning Report/EIS, KRD has 336,000 acre-feet of annual proratable water entitlements and Roza has 375,000 acre-feet of annual proratable water entitlements. Table 5-5 lists past water years when Roza's and KRD's water supply was less than 70 percent of their entitlements. Seventy percent is the threshold when the districts would use additional water from storage. Those conditions have occurred six times since 1987.

Table 5-5 Previous Proration Years below 70 Percent

Water Year	Proration Percentage
1987	64
1992	68
1993	56
1994	28
2001	40
2005	38

The remaining storage, up to 324,300 acre-feet, would be reserved for fish enhancement and would also not be added to the TWSA. Instead, an adaptive management team composed of Reclamation, fish agencies, and the Yakama Nation would recommend how the additional stored water would be used for fish enhancement. Reclamation would be responsible for operating the reservoir to meet those recommended releases.

Hydrologic Modeling

The Yakima Project RiverWare model (RiverWare) was used to assess the effects of the Bumping Lake Expansion – Large Option on selected indicators of surface water. RiverWare is a daily time-step reservoir and river simulation computer model. It uses a 25-year hydrologic period of historical water year of 1981-2005 (November 1, 1980-October 31, 2005) and provides daily, monthly, and yearly output for this period.

Modeling Assumptions

Certain modeling assumptions were made to assess the effects Bumping Lake Expansion – Large Option may have on surface water. These assumptions are based on the assumed operation of an expanded Bumping Lake as part of the Integrated Water Resource Management Alternative.

Currently, the minimum target release flow from Bumping Lake is set at 130 cfs. It was assumed that this target would be increased from April through June to provide additional flow for spring out-migration. Table 5-6 shows the assumed minimum instream flow required to be released from Bumping Lake.

Table 5-6 Bumping Lake Minimum Flow Releases for Instream Flow

Date	Minimum Flow Release(cfs)
November 1-March 31	130
April 1-April 15	365
April 16-June 15	600
June 16-June 30	365
July 1-October 31	130

It was also assumed that additional pulse flows would be released in drought years to augment spring flows in the Yakima River, measured at Parker gage. For modeling purposes, 42,000 acre-feet of the increased storage was assumed to be reserved for pulse flows. That volume equates to a release of 1,000 cfs for three weeks.

In most years, inflow to Bumping Lake will be passed through Bumping Dam into Bumping River, similar to what happens currently due to the relatively small storage capacity currently available. Storage water would be released to augment flow if the flow into Bumping Lake is less than the value shown in Table 5-6. For the purposes of hydrologic modeling in this EIS, the minimum flow release was applied to all years, which reshaped the hydrograph to have an earlier release for spring flow than currently occurs. The actual timing and quantities of releases would be set by a management team consisting of representatives from Reclamation, the Yakama Nation, irrigators, and fish agencies.

The reservoir from the Bumping Lake Expansion – Large Option was assumed to be filled from winter flows (November 1-March 31) greater than 130 cfs and during very high spring flow events where flow targets are met on Bumping River and the Yakima River at Parker gage. This situation occurs very infrequently so as to not affect spring flows in either river.

For purposes of this analysis, it was assumed that Roza Irrigation District would receive the increased irrigation water available during drought years due to the Bumping Lake Expansion – Large Option. Not all of the 100,000 acre-feet stored for irrigation would be released in a single drought year. Storage would be conserved to help meet water needs during a multi-year drought period.

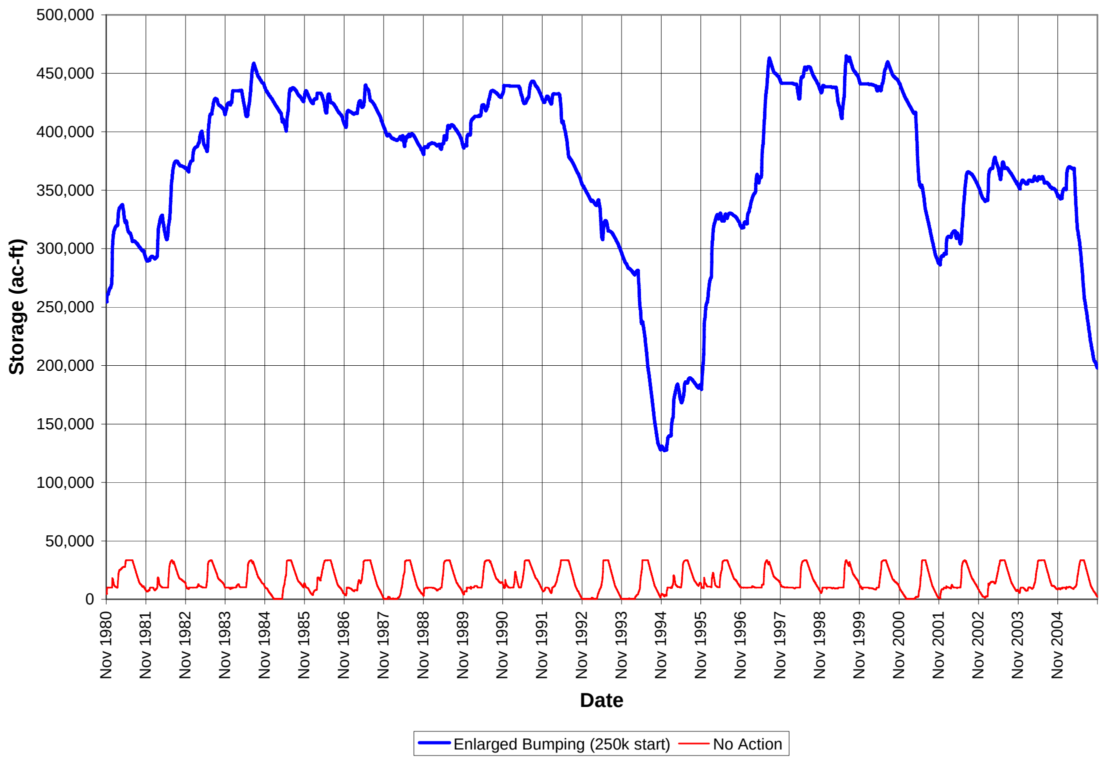
It should be noted that the actual operation of the Yakima Project with the Bumping Lake Expansion – Large Option has yet to be determined. These assumptions were made to be able to assess effects the Bumping Lake Expansion – Large Option would have on surface water of the Yakima River basin. Actual operation may be different than those assumptions described in this section.

Modeling Results

Reservoir Storage

Figure 5-2 shows a comparison of the storage volume in Bumping Lake between the No Action Alternative and the Bumping Lake Expansion – Large Option. This figure assumes that Bumping Lake begins with a volume of 250,000 acre-feet at the start of the modeling time period (November 1, 1980) for the Bumping Lake Expansion – Large Option. An analysis was also performed with an assumption that the reservoir was empty at the beginning of the analysis period. The results were that the reservoir would fill to the same level regardless of the starting assumption, so the 250,000 acre-feet assumption was used for the remainder of the modeling and the presentation of results.

Figure 5-2 Bumping Lake Storage Volume



Irrigation Supply

Figure 5-3 and Table 5-7 show a comparison of the water supplied to Roza Irrigation District between the No Action Alternative and the Bumping Lake Expansion – Large Option. As stated in the modeling assumptions, it was assumed that Roza Irrigation District would get the additional amount of irrigation water available from the Bumping Lake Expansion – Large Option during drought years. The actual distribution of additional irrigation supply has yet to be determined.

The modeling shows an increase in water supply in drought years, including an increase of 65,000 acre-feet in 1994, the third year in an extended drought. A slight decrease in water supply is shown in some years, which can be attributed to the difficulty of modeling a complex system like the Yakima Project. The model cannot simulate the exact operations of the Yakima Project. However there was sufficient storage remaining in Bumping Lake during those years and no changes in storage in other Yakima Project reservoirs so a reduction in water supply would not occur.

Figure 5-3 Roza Irrigation District Water Supply

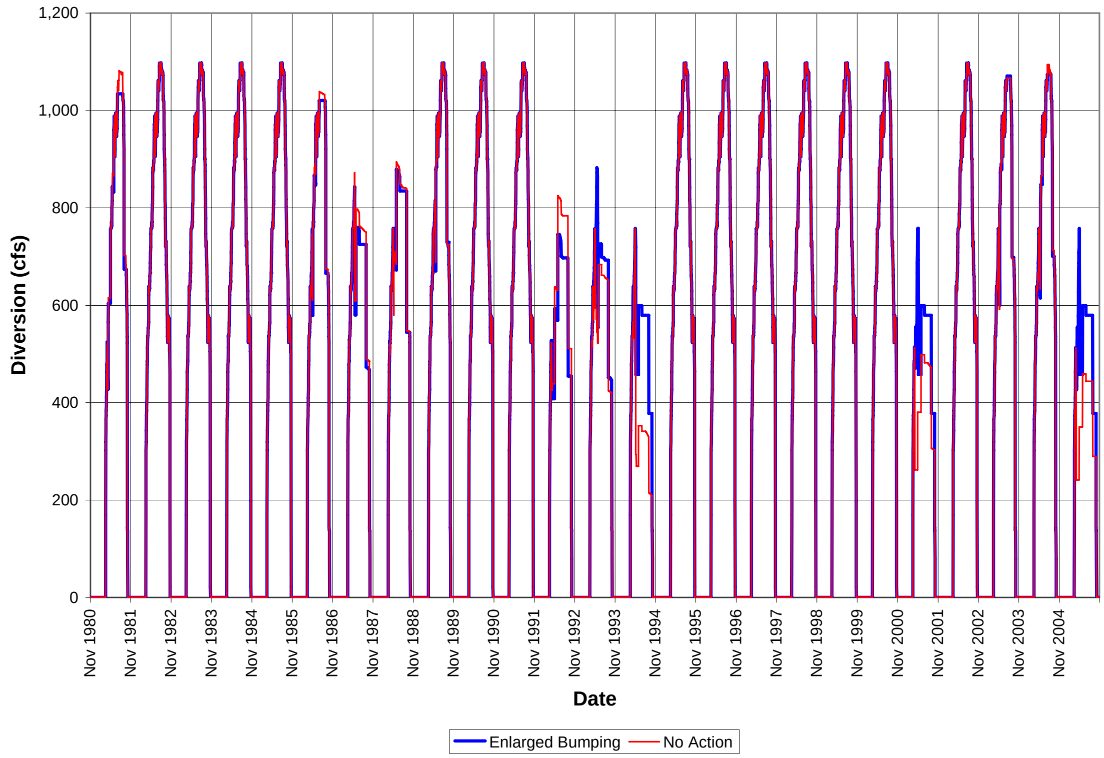


Table 5-7 Roza Irrigation District Water Supply

Year	Roza Irrigation Volume (ac-ft)		Proration Percentage Based on Entitlement (375,000 ac-ft)		
	Current Operations	Bumping Lake Expansion – Large Option	Current Operations	Bumping Lake Expansion – Large Option	Difference
1981	322,028	315,750	86%	84%	-2%
1982	349,844	349,844	93%	93%	0%
1983	349,844	349,844	93%	93%	0%
1984	349,844	349,844	93%	93%	0%
1985	349,844	349,844	93%	93%	0%
1986	319,662	317,290	85%	85%	-1%
1987	261,924	254,105	70%	68%	-2%
1988	279,714	277,885	75%	74%	0%
1989	324,801	324,431	87%	87%	0%
1990	349,842	349,842	93%	93%	0%
1991	349,842	349,842	93%	93%	0%
1992	252,686	230,285	67%	61%	-6%
1993	229,523	249,169	61%	66%	5%
1994	143,055	208,829	38%	56%	18%

Year	Roza Irrigation Volume (ac-ft)		Proration Percentage Based on Entitlement (375,000 ac-ft)		
	Current Operations	Bumping Lake Expansion – Large Option	Current Operations	Bumping Lake Expansion – Large Option	Difference
1995	349,844	349,844	93%	93%	0%
1996	349,842	349,842	93%	93%	0%
1997	349,844	349,844	93%	93%	0%
1998	349,842	349,842	93%	93%	0%
1999	349,844	349,844	93%	93%	0%
2000	349,844	349,844	93%	93%	0%
2001	159,252	205,541	42%	55%	12%
2002	349,844	349,844	93%	93%	0%
2003	322,609	322,466	86%	86%	0%
2004	323,775	321,956	86%	86%	0%
2005	148,304	204,106	40%	54%	15%
Average (non-prorated years)	349,844	349,844			

Bumping River Flow

As stated in Section 3.3.3.1, flow in Bumping River is controlled by Bumping Lake operations. Currently, flow is regulated but similar to unregulated flow in the winter, lower than unregulated flow in the spring, and higher than unregulated flow in the summer. Figure 5-4 shows a comparison of median flows in the Bumping River below Bumping Dam between the No Action Alternative and the Bumping Lake Expansion – Large Option. Figures 5-5 through 5-7 show a comparison of flow in the Bumping River below Bumping Dam for drought years 1994, 2001, and 2005, respectively.

Figure 5-4 Bumping River below Bumping Dam – Median Flows

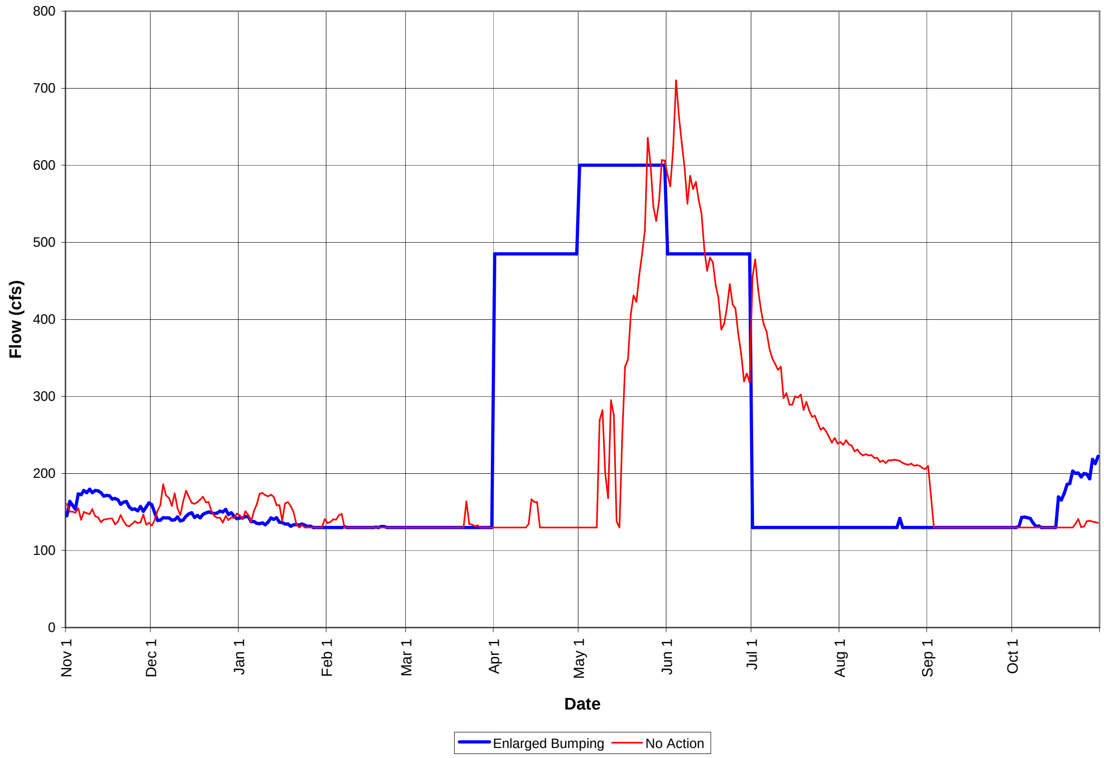


Figure 5-5 Bumping River below Bumping Dam Flow – Drought Year 1994

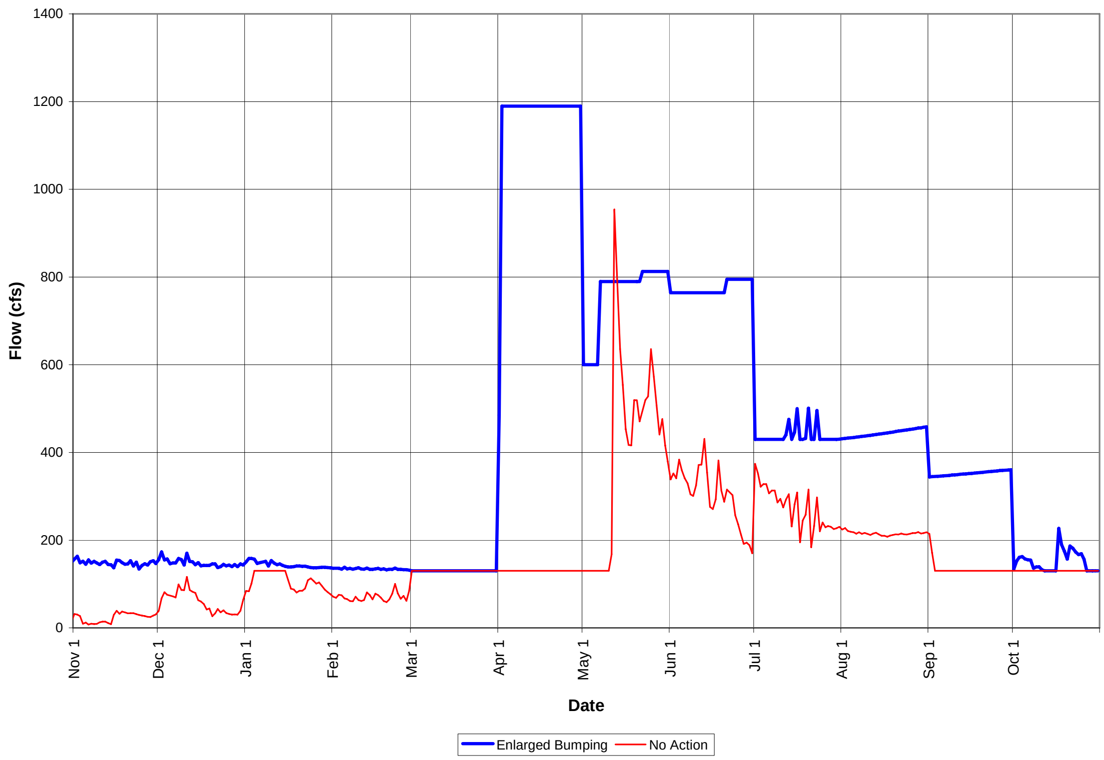


Figure 5-6 Bumping River below Bumping Dam Flow – Drought Year 2001

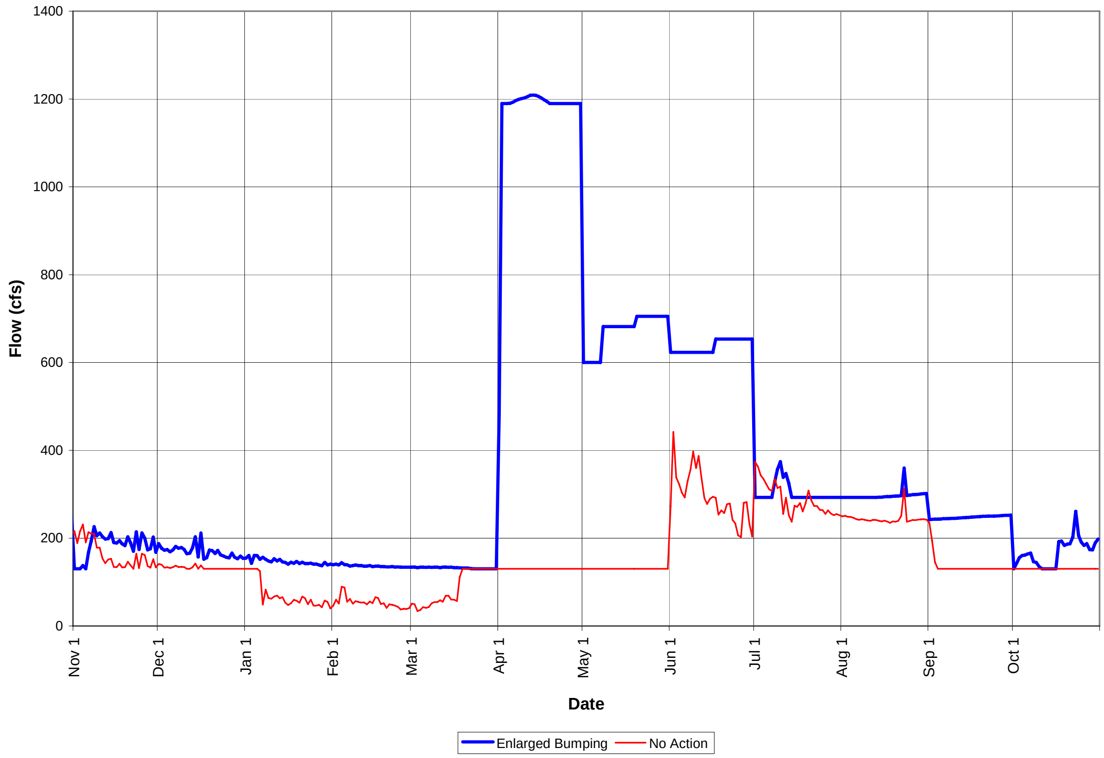
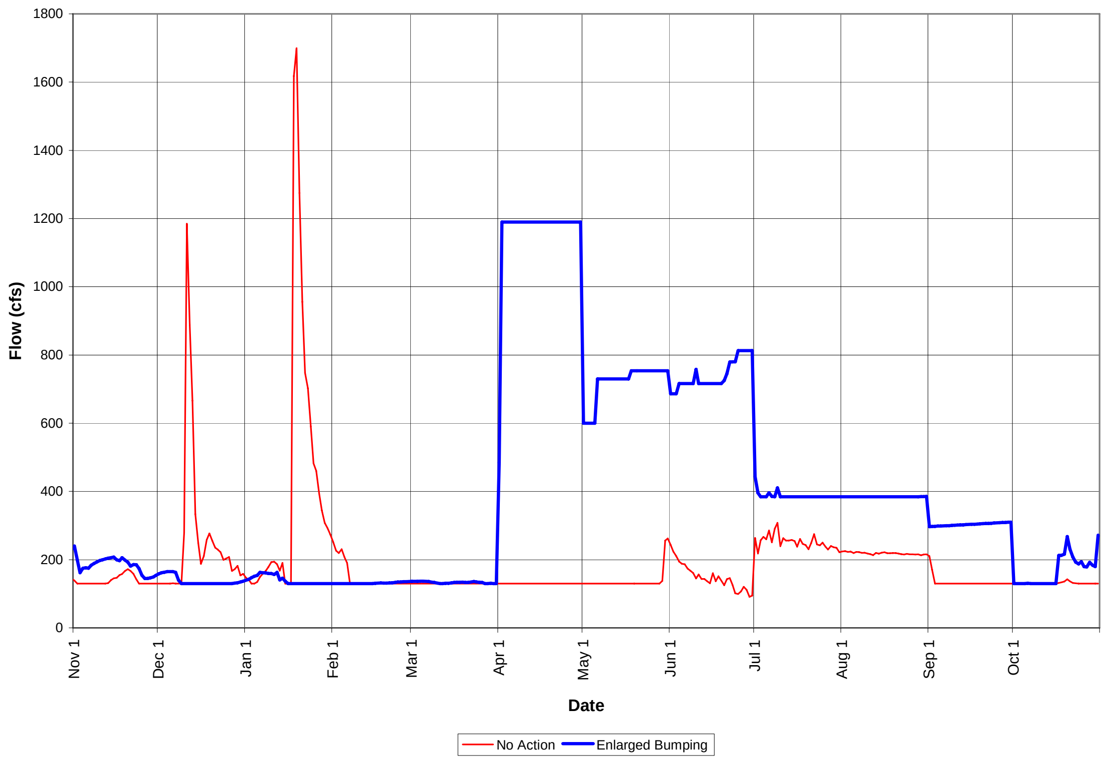


Figure 5-7 Bumping River below Bumping Dam Flow – Drought Year 2005



As shown in Figure 5-4, the Bumping Lake Expansion – Large Option would increase Bumping River flows during spring months and slightly decrease flows during summer months compared to the No Action Alternative.

During drought years, the Bumping Lake Expansion – Large Option would substantially increase Bumping River flows in spring and summer. The spring flow increase is provided from storage to increase spring flows for smolt outmigration in the Bumping, Naches and Yakima Rivers. Currently, in drought years, spring flows are very low in those rivers. The increase in summer months is due to the release of storage water for irrigation purposes. Water is released from Bumping Reservoir to offset the additional water supplied to Roza Irrigation District from upper basin reservoirs.

Naches River Flow near Naches

The Naches River near Naches has mostly unregulated flow but is also influenced by Bumping Lake and Rimrock Lake operations. Currently, flow is lower than unregulated flow in the spring and much higher than unregulated flow during September and October due to irrigation releases and the flip-flop operation. Figure 5-8 shows a comparison of median flows at Naches River near Naches between the No Action Alternative and the Bumping Lake Expansion – Large Option. Figures 5-9 through 5-11 show a comparison of flow data at Naches River near Naches for drought years 1994, 2001, and 2005, respectively.

Figure 5-8 Naches River near Naches – Median Flows

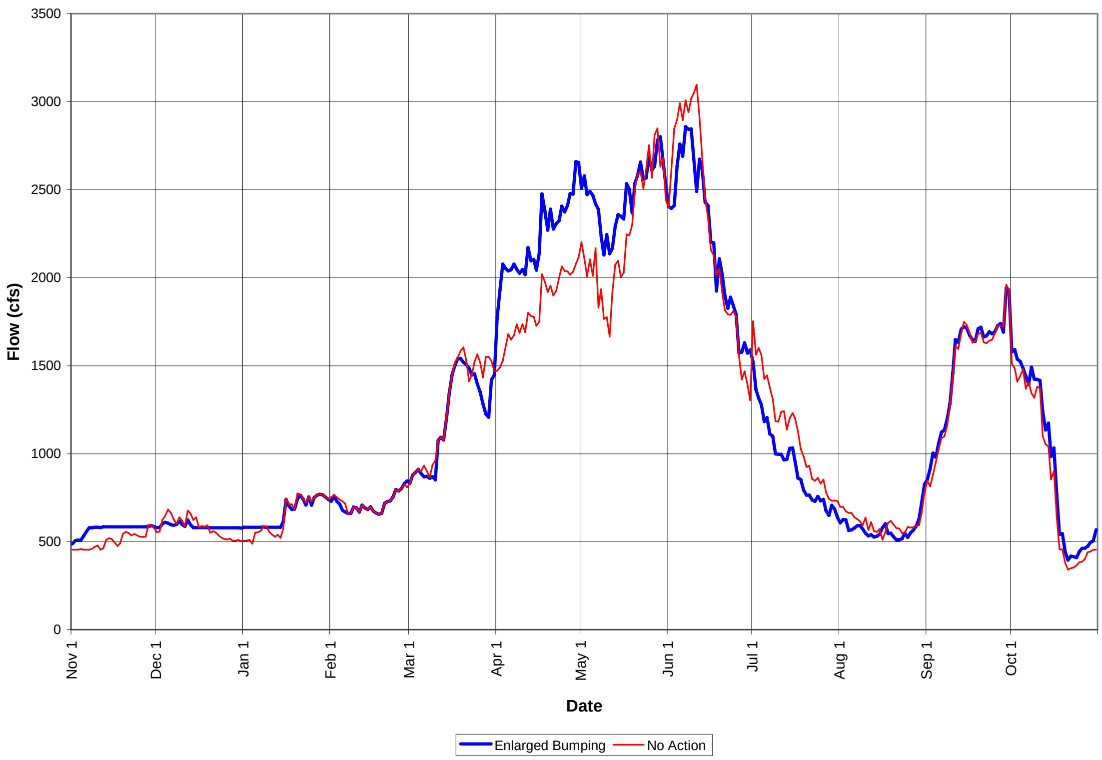


Figure 5-9 Naches River near Naches Flow – Drought Year 1994

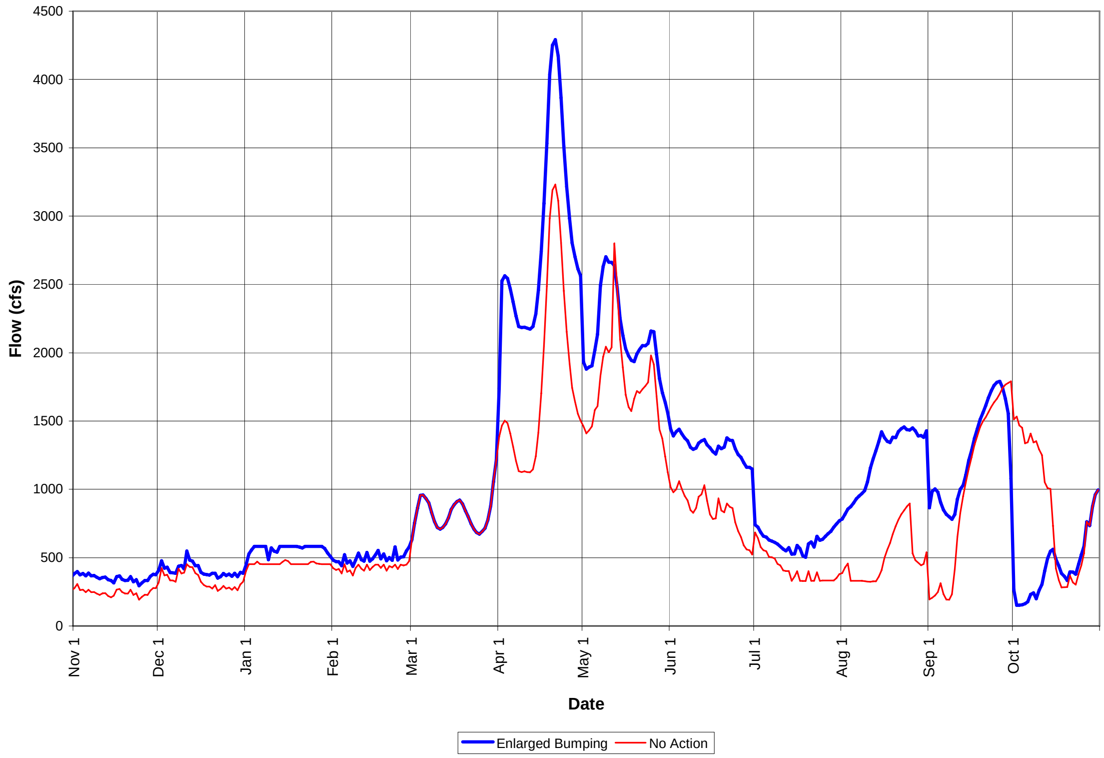


Figure 5-10 Naches River near Naches Flow – Drought Year 2001

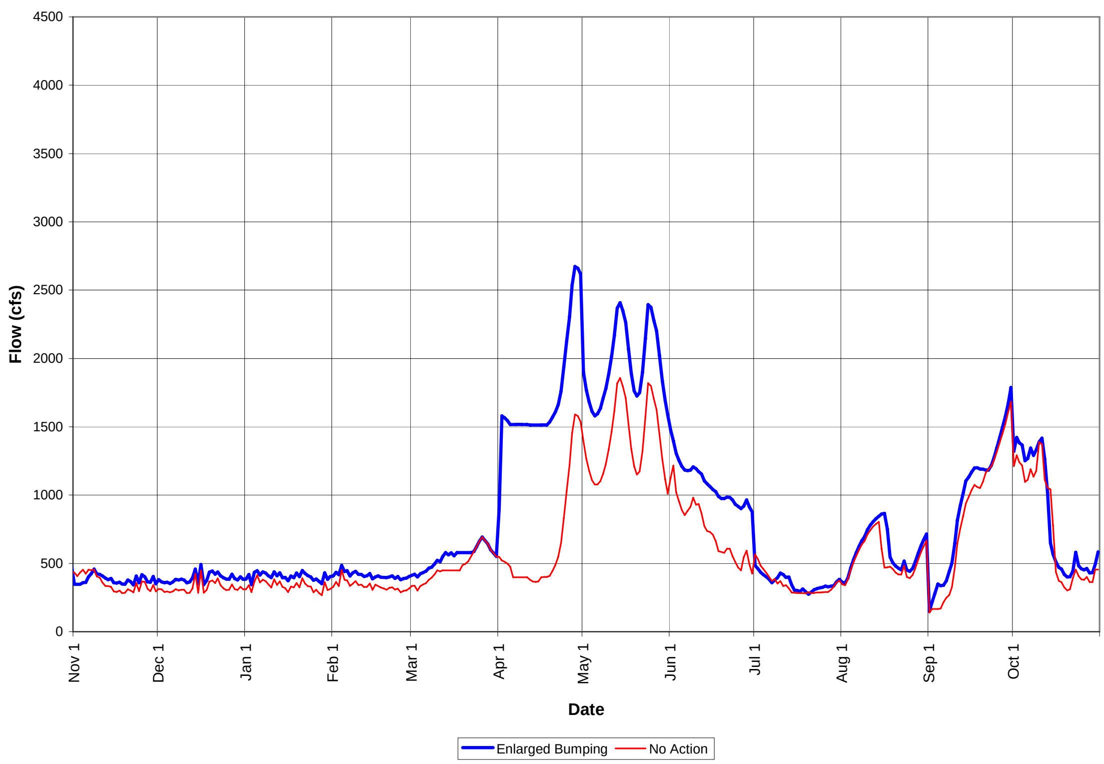
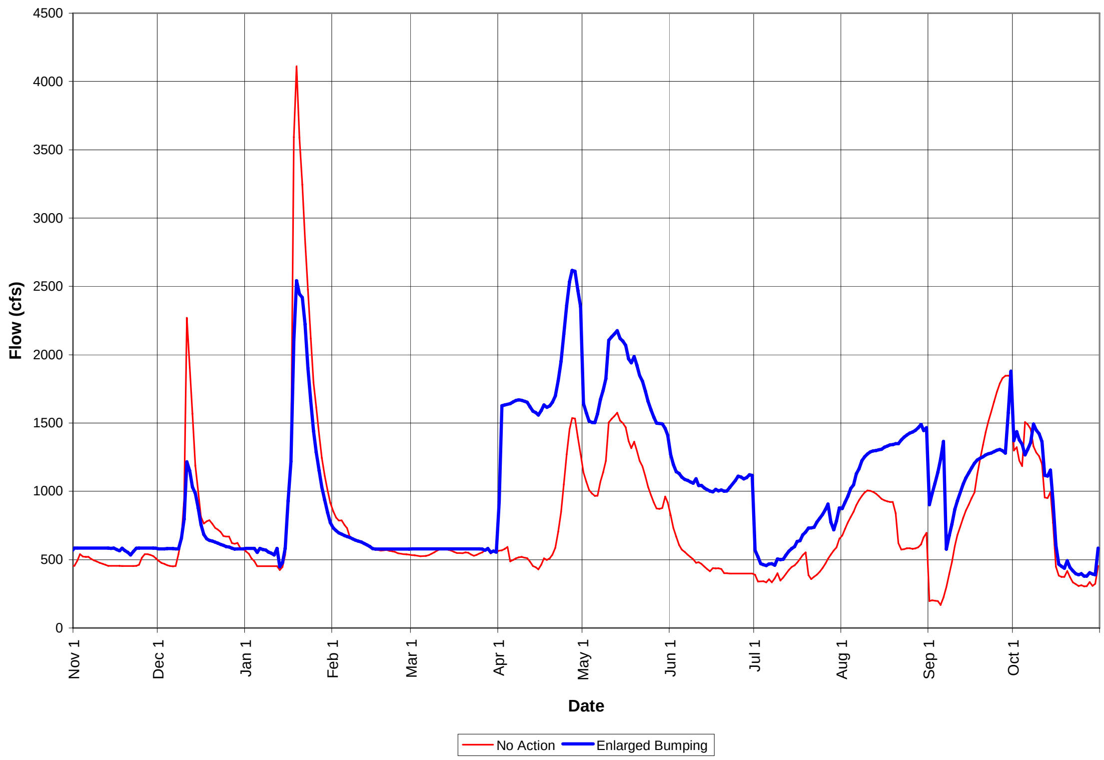


Figure 5-11 Naches River near Naches Flow – Drought Year 2005



As shown in Figure 5-8, the Bumping Lake Expansion – Large Option would increase flow in the Naches River near Naches during spring months and slightly decrease flow during summer months compared to the No Action Alternative. Flip-flop operations would not be changed.

During drought years, the Bumping Lake Expansion – Large Option would substantially increase flow in the Naches River near Naches during spring and summer months. Flip-flop operations would not be changed much.

Yakima River Flow at Umtanum

Flow in the Yakima River at Umtanum is currently lower than unregulated flows in spring and higher than unregulated flows in summer due to storage and releases for irrigation water supply. With the Bumping Lake Expansion – Large Option the flow regime would not substantially change. Figure 5-12 shows a comparison of flow in the Yakima River at Umtanum between the No Action Alternative and the Bumping Lake Expansion – Large Option. Figures 5-13 through 5-15 show a comparison of flow in the Yakima River at Umtanum for drought years 1994, 2001, and 2005, respectively.

Figure 5-12 Yakima River at Umtanum – Median Flows

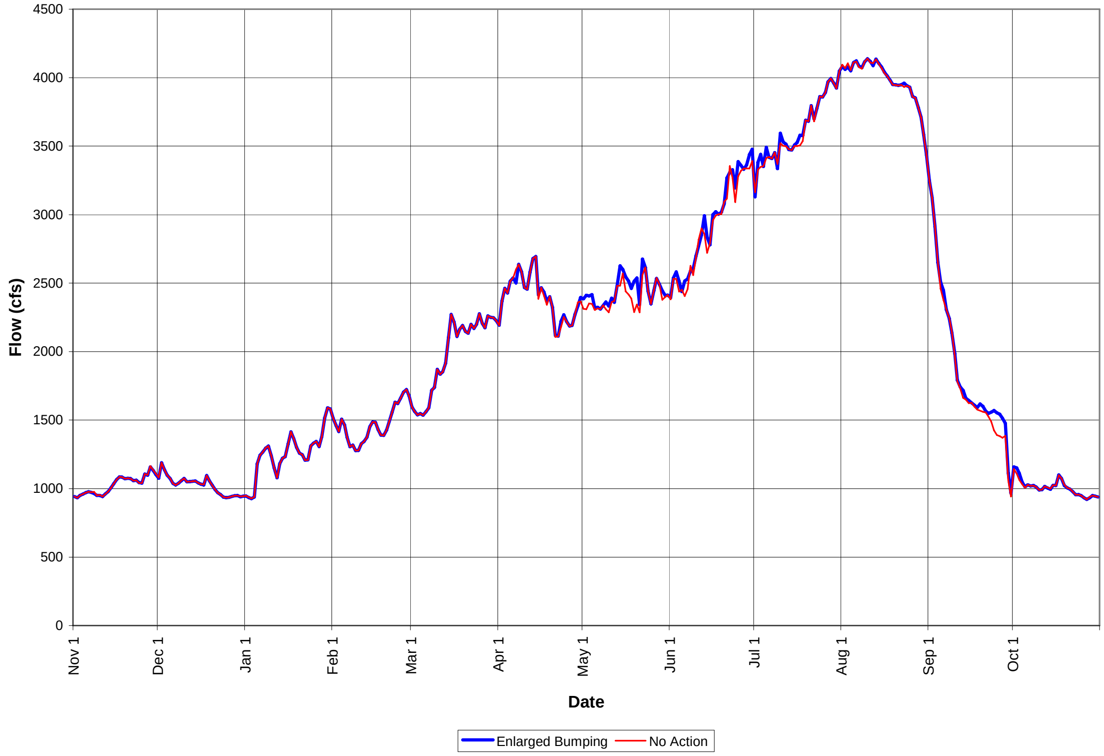


Figure 5-13 Yakima River at Umtanum Flow – Drought Year 1994

Figure 5-14 Yakima River at Umtanum Flow – Drought Year 2001

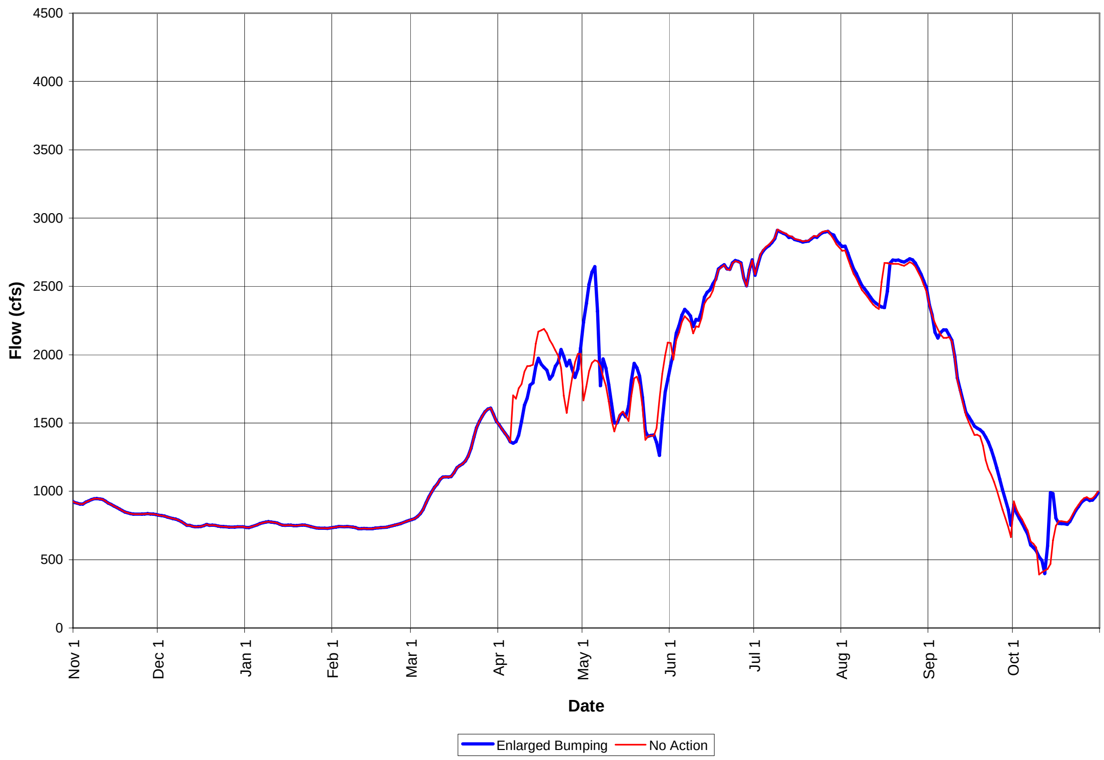
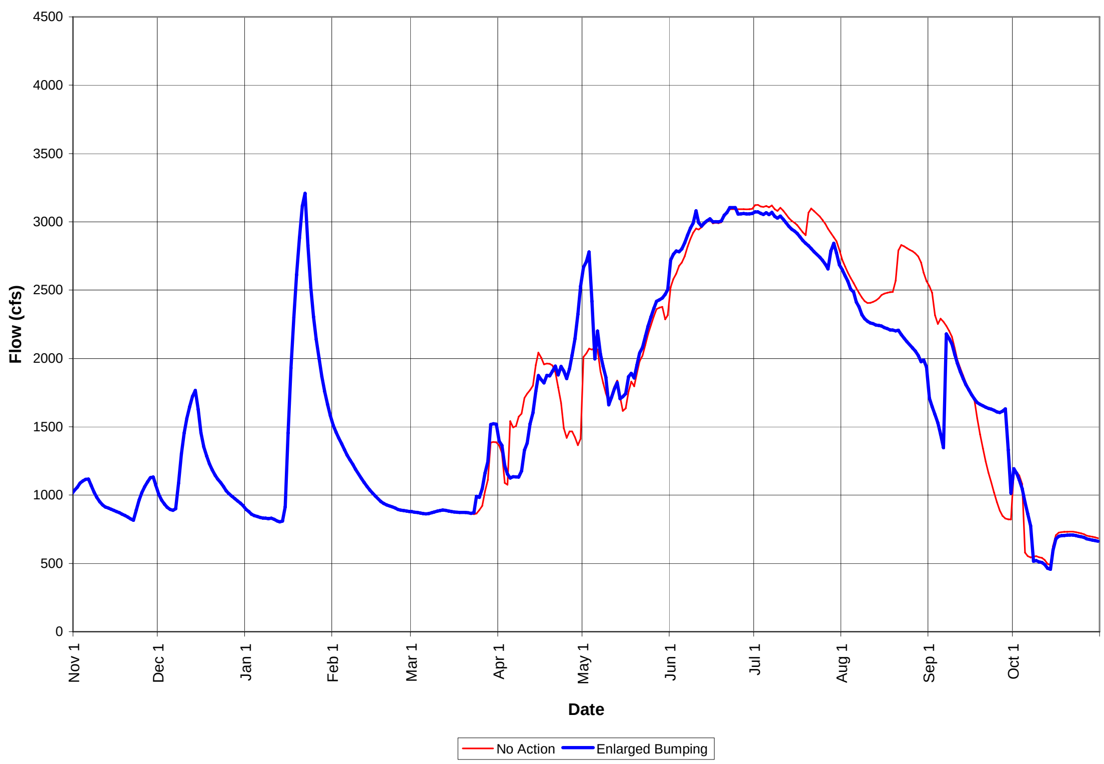


Figure 5-15 Yakima River at Umtanum Flow – Drought Year 2005



Yakima River Flow at Parker

Flow in the Yakima River at Parker is currently much lower than unregulated flows in spring and summer due to storage and diversions for irrigation water supply. Figure 5-16 shows a comparison of flow in the Yakima River at Parker between the No Action Alternative and the Bumping Lake Expansion – Large Option. Figures 5-17 through 5-19 show a comparison of flow in the Yakima River at Parker for drought years 1994, 2001, and 2005, respectively.

Figure 5-16 Yakima River at Parker – Median Flows

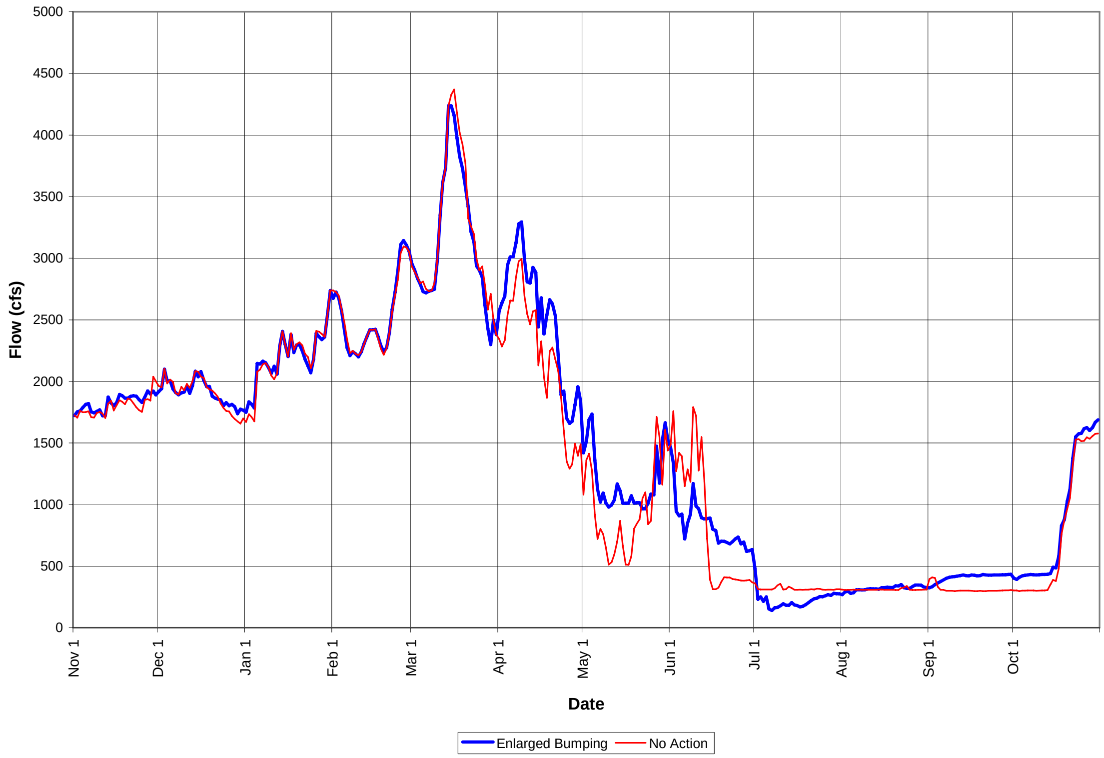


Figure 5-17 Yakima River at Parker Flow – Drought Year 1994

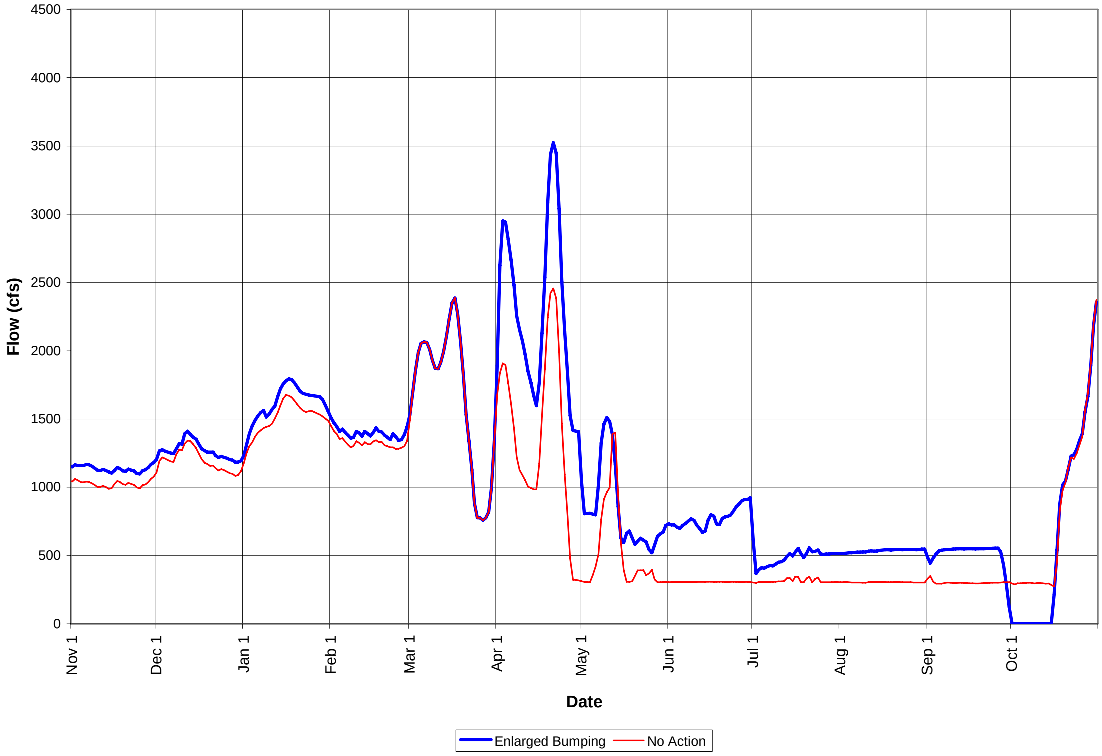


Figure 5-18 Yakima River at Parker Flow – Drought Year 2001

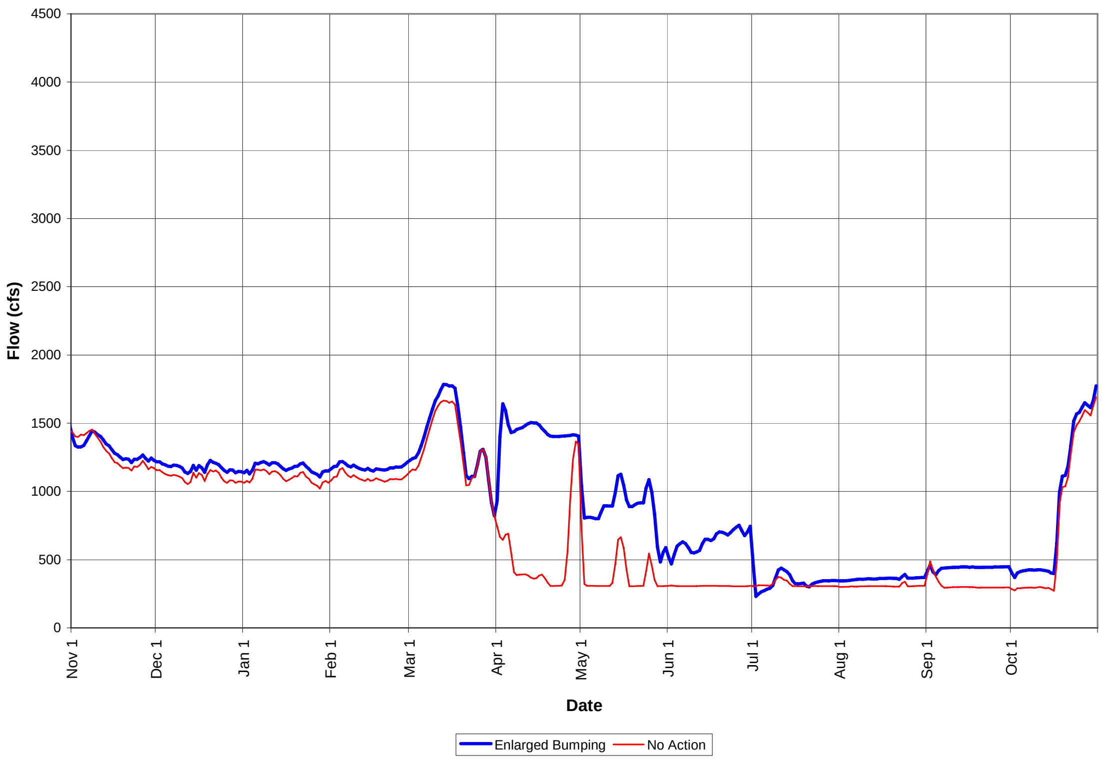
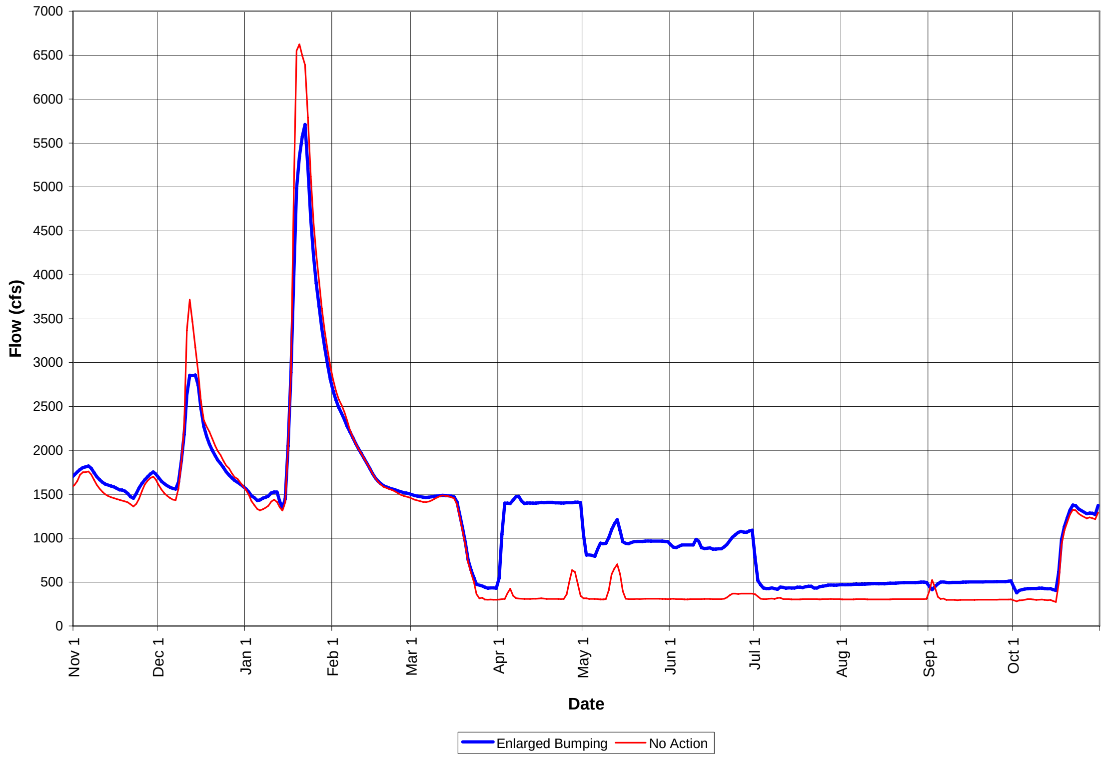


Figure 5-19 Yakima River at Parker Flow – Drought Year 2005



As shown in Figure 5-16, the median flow in the Yakima River at Parker is only slightly affected by the Bumping Lake Expansion – Large Option compared to the No Action Alternative.

During drought years, higher flows occur in spring and summer. The increase in flow in April is approximately 1,000 cfs, a 4-fold increase from flow in 2001 and 2005. Although the model shows a drop in October flows in 1994, this was a modeling issue and would not occur in the actual management of the Yakima Project. There is still sufficient storage available in the enlarged Bumping Lake (see Figure 5-2) to ensure instream flows would be met at the Parker gage.

Hydrologic Indicators

Hydrologic indicators are used to show the effects an alternative has on the Yakima Project water supply over the 25-year hydrologic modeling period. Table 5-8 shows the changes in hydrologic indicators between the No Action Alternative and the Bumping Lake Expansion – Large Option.

Table 5-8 Hydrologic Indicators of Bumping Lake – Large Option Compared to No Action Alternative

Hydrologic Indicator	No Action Alternative				Bumping Lake Expansion – Large Option			
	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005
April 1 TWSA (maf)	2.82	1.75	1.80	1.76	2.81	1.75	1.80	1.73
April-September flow volume at Parker gage (kaf)	506	188	131	119	522	327	246	284
April-September diversion volume upstream of Parker gage (maf)	2.02	1.48	1.59	1.56	2.01	1.52	1.60	1.54
September 30 non-Bumping reservoir contents (kaf)	255	61	70	93	254	28	64	78
September 30 Bumping reservoir contents (kaf)	11	6	6	7	364	134	295	204
April-September flow volume at mouth of Yakima River (kaf)	847	322	250	283	863	468	368	451
Irrigation proration level (percent)[1]	85%	28%	40%	38%	84%	20%	34%	26%

[1] – Irrigation proration level does not include irrigation water set specifically for Roza Irrigation District during drought years.

April 1 TWSA

The April 1 TWSA is no different between the No Action Alternative and the Bumping Lake Expansion – Large Option. Slight differences may show up in the results of the model but those differences are attributable to the complexity of modeling the Yakima Project.

April-September Yakima River Flow Volume at Parker

The Bumping Lake Expansion – Large Option will increase the flow volume at Parker from April to September compared to the No Action Alternative, primarily in drought years. During drought years, the flow volume at Parker gage increases significantly. In 1994, the flow volume at Parker gage increases by 74 percent. In 2001 and 2005, the flow volumes at Parker gage increase by 88 percent and 139 percent, respectively.

April-September Diversion Volume Upstream of the Parker Gage

No changes would result in April-September diversion volumes upstream of the Parker gage. Slight differences may show up in the results of the model but those differences are also attributable to the complexity of modeling the Yakima Project.

September 30 Reservoir Contents

No change in the average reservoir contents over the period modeled occurs; however, slight changes show up in the modeling for drought years. These drought year results are also related to the complexity of modeling the Yakima Project and simulating extra releases for Roza Irrigation District from upper basin reservoirs while balancing releases from Bumping Lake. They are not likely to occur in real operations. Sufficient storage is available in Bumping Lake during those drought years to make up the difference shown in the modeling results. The September 30 storage in Bumping Lake is 134,000 acre-feet in 1994, 295,000 acre-feet in 2001 and 204,000 acre-feet in 2005.

Table 5-9 presents a comparison of reservoir storage on March 31, June 30, and September 30 for the Bumping Lake Expansion – Large Option and the No Action Alternative.

Table 5-9 Yakima Project Reservoir Contents (kaf)

Date – Reservoir	No Action Alternative				Bumping Lake Expansion – Large Option			
	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005
March 31 – Bumping	11	4	2	10	380	282	417	369
March 31 – All others	592	202	343	620	587	198	335	597
June 30 – Bumping	33	33	33	33	374	198	333	260
June 30 – All others	875	530	544	603	872	510	533	569
Sept 30 – Bumping	11	6	6	7	364	134	295	204
Sept 30 – All others	255	61	70	93	254	28	64	78

April-September Yakima River Flow Volume at Mouth

The April-September flow volume in the Yakima River at the mouth would be significantly increased for the Bumping Lake Expansion – Large Option compared to the No Action Alternative on average and during the drought years of 1994, 2001, and 2005.

Irrigation Proration Level

The irrigation proration level compares the percentage of water entitlements junior water users are allowed to use in a certain year. A slight decrease in proration level is shown; however, the difference is likely due to modeling issues. No change in TWSA or irrigation deliveries would occur in any year with the enlarged Bumping Lake project. An increase in deliveries would occur to districts that help fund the project.

Seasonal Flow Volume Objectives

Table 5-10 presents the seasonal flow volume objectives for the Yakima River at Umtanum and Parker gages. Seasonal flow volume objectives are developed from unregulated flow regimes for the Yakima, Naches, Cle Elum, Bumping, and Tieton Rivers. Table 5-10 also presents the average seasonal flow volumes for the Yakima River at Umtanum and Parker gages for the Bumping Lake Expansion – Large Option as well as the No Action Alternative.

Table 5-10 Seasonal Flow Volumes for the Bumping Lake – Large Option

Alternative	Umtanum Flows (maf)			Parker Flows (maf)		
	Spring	Summer	Winter	Spring	Summer	Winter
Objective	0.636	0.298	0.280	0.717	0.309	0.490
No Action	0.676	0.620	0.380	0.659	0.138	0.696
Bumping Lake Expansion – Large Option	0.679	0.619	0.380	0.680	0.133	0.687

Notes: Spring – March-June; the desired outcome is to meet or exceed the flow objective volume
Summer – July-October; the desired outcome is to not exceed, but not far too far below the flow objective volume
Winter – November-February; the desired outcome is to meet or exceed the flow objective volume

The Bumping Lake Expansion – Large Option would not significantly change the average seasonal flows. However in drought years the spring and summer flow at Parker would increase significantly as shown in Table 5-8.

Bumping Lake Expansion – Small Option

Many of the effects of the Bumping Lake Expansion – Small Option would be similar to those for the Bumping Lake Expansion – Large Option. The major differences are the storage capacity and the ability to supply irrigation and fish enhancement during an extended drought period.

Reservoir Storage Capacity

The small option for the Bumping Lake enlargement would change the storage capacity for Bumping Lake from 33,700 acre-feet to 250,000 acre-feet. Of this additional storage, a maximum of 100,000 acre-feet is assumed to be used to enhance proratable irrigation during drought years when the TWSA is less than 70 percent. The remaining storage, up to 116,300 acre-feet, would be reserved for fish enhancement. The specific uses for the additional storage water would be dependent on flow and water supply conditions and would be determined by a management team consisting of representatives from Reclamation, the Yakama Nation, major irrigators, and fish agencies.

Table 5-11 summarizes the water storage capacity in reservoirs before and after completion of the small option for the Bumping Lake enlargement.

Table 5-11 Water Storage Capacity in Yakima Project Reservoirs – Small Option

Storage Location (Reservoirs)	Before Enlargement (acre-feet)	After Enlargement (acre-feet)
Upper Yakima: Keechelus, Kachess, Cle Elum	833,700	833,700
Naches Arm: Bumping, Rimrock, Clear Creek	237,000	453,300
TOTAL	1,070,700	1,287,000

Available Flow after Refilling

For the Bumping Lake Expansion – Small Option, there would be less flow available during droughts and flow targets stated in the "Modeling Assumptions" section of the Bumping Lake Expansion – Large Option may have to be reduced. In the Bumping Lake Expansion – Large Option, 305,500 acre-feet of Bumping Lake storage was used in the 1992-1994 drought year period. For the Bumping Lake Expansion – Small Option, there would not be enough water to utilize the same flow targets. The third year of a drought period would have less water available for irrigation and flow targets for the Bumping Lake Expansion – Small Option compared to the Bumping Lake Expansion – Large Option.

Other Potential Water Storage Sites

Additional potential water storage sites within the Naches basin would have similar impacts to surface water as those described in this section for Bumping Lake expansion options, with the exception of the Bumping River. Because the potential locations are located downstream of the Bumping River confluence with the Naches River, other potential water storage sites would not affect the Bumping River.

Summary of Impacts

A qualitative analysis of impacts to flows was made for the Naches River storage reservoirs option assuming the large Bumping Lake option would be constructed. The other potential storage reservoirs in the Naches River basin would have similar impacts. The qualitative analysis illustrates the potential benefit or impact to the flow regime for winter, spring, and summer flows in the reaches of the Yakima River, Naches River, and tributaries described in Chapter 3. The benefit to the flow regime may be increased or decreased flow in a reach or tributary during a particular season. The magnitude of that increase or decrease relative to a flow regime that more closely resembles the natural hydrograph was qualitatively assessed and described as having no benefit or impact, or having a low, medium, or high benefit or impact. The benefits and impacts are illustrated in Table 5-12 for the upper, middle, and lower Yakima River.

Table 5-12 Summary of Impacts to Flow by New Storage Elements (Naches River basin Storage) – Upper, Middle, and Lower Yakima River

Season	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Winter (Oct-March)	○	▪	○	▪	▪	○	○	○	○	○	○	○	○	○	○	○
Spring (April-June)	○	▪	○	▪	▪	○	○	○	◒	◒	○	○	○	○	○	○
Summer (July-Sept)	○	▪	○	▪	▪	○	○	○	▪	▪	○	○	○	○	○	○

Season	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Winter (Oct-March)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spring (April-June)	◒	○	◒	○	○	○	○	○	▪	▪	○	○	▪	▪	▪	○	○	▪	▪
Summer (July-Sept)	▪	○	○	○	○	◒	◒	○	◒	◒	○	○	◒	◒	◒	○	○	◒	◒

Symbol	
●	High Benefit
◒	Medium Benefit
▪	Low Benefit
○	No Change or Benefit

Wymer Reservoir

Reservoir Storage Capacity

Wymer Reservoir would have an active capacity of 162,500 acre-feet. Of this capacity, 82,500 acre-feet of the storage volume would be used for fish enhancement purposes, and 80,000 acre-feet of the storage volume would be reserved for proratable irrigation supply during drought years when the proration supply is below 70 percent. Table 5-13 describes the water storage capacity in reservoirs before and after Wymer Reservoir is complete.

Table 5-13 Water Storage Capacity in Yakima Project Reservoirs – Wymer Reservoir

Storage Location (Reservoirs)	Before Wymer (acre-feet)	After Wymer (acre-feet)
Upper Yakima—Keechelus, Kachess, Cle Elum, Wymer	833,700	996,200
Naches Basin—Bumping, Rimrock, Clear Creek	237,000	237,000
TOTAL	1,070,700	1,233,200

Reservoir Operations

Reclamation's EIS

In the December 2008 Final Planning Report/EIS, it was assumed that 82,500 acre-feet would be released from Wymer Reservoir every year in July and August to meet downstream irrigation demands and Title XII (YRBWEP) target flows downstream from Sunnyside Dam. This volume would be supplied by October-May releases from Cle Elum Lake and pumped into Wymer Reservoir from a pump station located on the Yakima River at River Mile 135.0. This operation would reduce upper Yakima River and Cle Elum River summer flows and increase Cle Elum River winter flows.

The remaining 80,000 acre-feet would be released only in drought years when the irrigation proration level was less than 70 percent for proratable irrigation supply. When this supply is not full, water would be pumped from the Yakima River into Wymer Reservoir when January-March flows in the Yakima River are above 1,475 cfs.

Integrated Water Resource Management Alternative

The Wymer Reservoir option within the Integrated Water Resource Management Alternative also assumes that 82,500 acre-feet would be released every year in July and August to meet downstream irrigation demands and Title XII (YRBWEP) target flows downstream from Sunnyside Dam. This volume would be supplied by October-March releases from Cle Elum Lake and from flows from unregulated tributaries. A pump station would be located near Thorp (approximately River Mile 169.3) and water would be delivered to Wymer Reservoir through an expanded KRD North Branch Canal or separate pipeline.

The remaining 80,000 acre-feet would also be released only in drought years when the irrigation proration level was less than 70 percent for proratable irrigation supply. The storage volume was assumed to be part of TWSA for this option. When this supply is not full, flood water that would normally be released from Cle Elum Lake during the winter when the flood curve rule would be exceeded would be diverted by the Thorp pump station and conveyed to Wymer Reservoir. Additional water for irrigation supply storage would be pumped from the Yakima River near Thorp October-March when the target flow downstream of Roza Dam is met.

For the purposes of hydrologic modeling, it was assumed that up to 500 cfs would be pumped from the Thorp pump station to the KRD North Branch Canal. For the modeling it was also assumed the water supply for KRD North Branch Canal and for Wymer Reservoir is conveyed in the same canal. This would increase flow in the Yakima River between Easton and Thorp during the irrigation season while at the same time reduce flow in the reach between Thorp and Wymer Reservoir. It would also make the KRD water supply more reliable and reduce risks of operating their Main Canal.

Hydrologic Modeling

The RiverWare model was used for hydrologic modeling of Wymer Reservoir. See Section 5.3.2.3 for additional details on this model.

Modeling Assumptions

Certain modeling assumptions were made to assess the effects Wymer Reservoir may have on surface water. These assumptions are based on the assumed operation of Wymer Reservoir as a stand-alone part of the Integrated Water Resource Management Alternative. The water supply option used in the modeling is based on the Thorp to Wymer Option described above.

The pump station near Thorp and corresponding pipeline conveyance system in the Wymer Reservoir option is assumed to be able to have the capacity to deliver 1,000 cfs of water from theYakima River to Wymer Reservoir.

Of the storage space, 80,000 acre-feet is assumed to be carryover storage used when the water supply is below a 70 percent proration level. The remaining storage space (82,500 acre-feet) is assumed to enhance instream flows and is released during July and August.

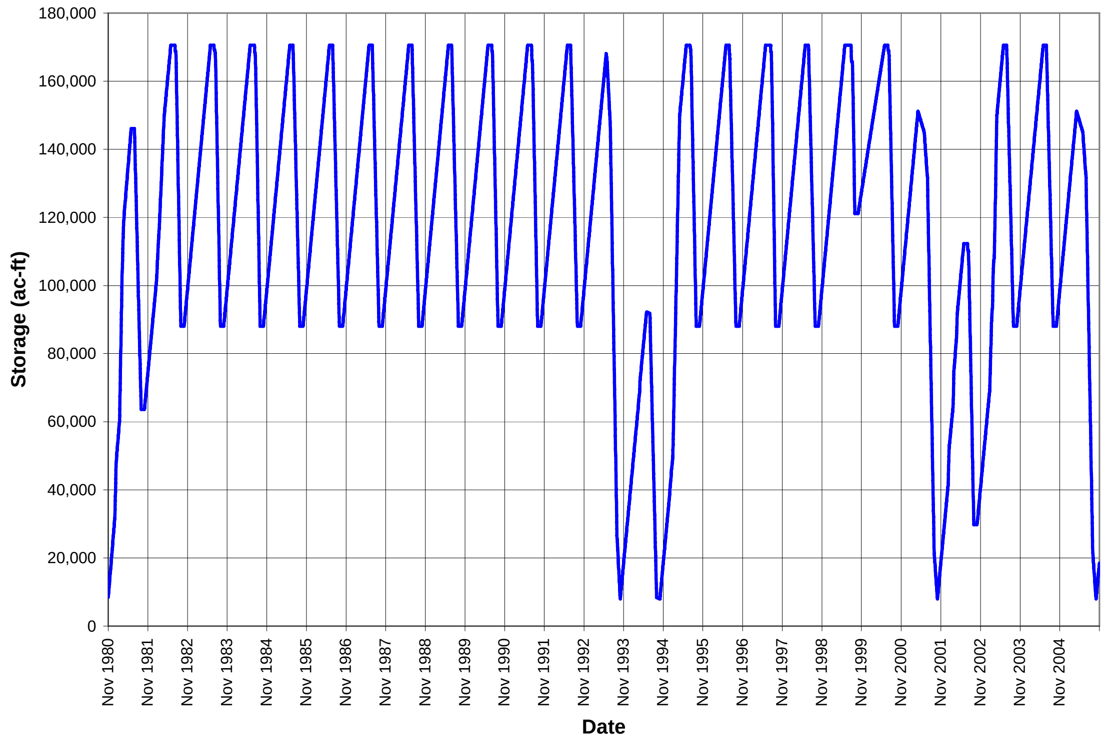
Wymer Reservoir is assumed to be filled by releases from Cle Elum Dam anytime instream flow targets are met at Parker. Diversions to Roza Power Plant are assumed to be subordinated during winter months to allow Wymer Reservoir to be filled.

Modeling Results

Reservoir Storage

Figure 5-20 shows the storage volume in Wymer Reservoir for the period of record modeled for the Thorp to Wymer option.

Figure 5-20 Wymer Reservoir Storage Volume



Cle Elum River Flow

Cle Elum River flow below Cle Elum Dam is controlled by releases from Cle Elum Lake. Currently, flow in the Cle Elum River below Cle Elum Dam is higher than unregulated flow in summer and lower than unregulated flow in winter and spring. Figure 5-21 shows a comparison of median flow in the Cle Elum River below Cle Elum Dam between the No Action Alternative and the Wymer Reservoir – Thorp to Wymer Option. Figures 5-22 through 5-24 show a comparison of median flows in the Cle Elum River below Cle Elum Dam for drought years 1994, 2001, and 2005, respectively.

Figure 5-21 Cle Elum River below Cle Elum Dam – Median Flows for Wymer Reservoir

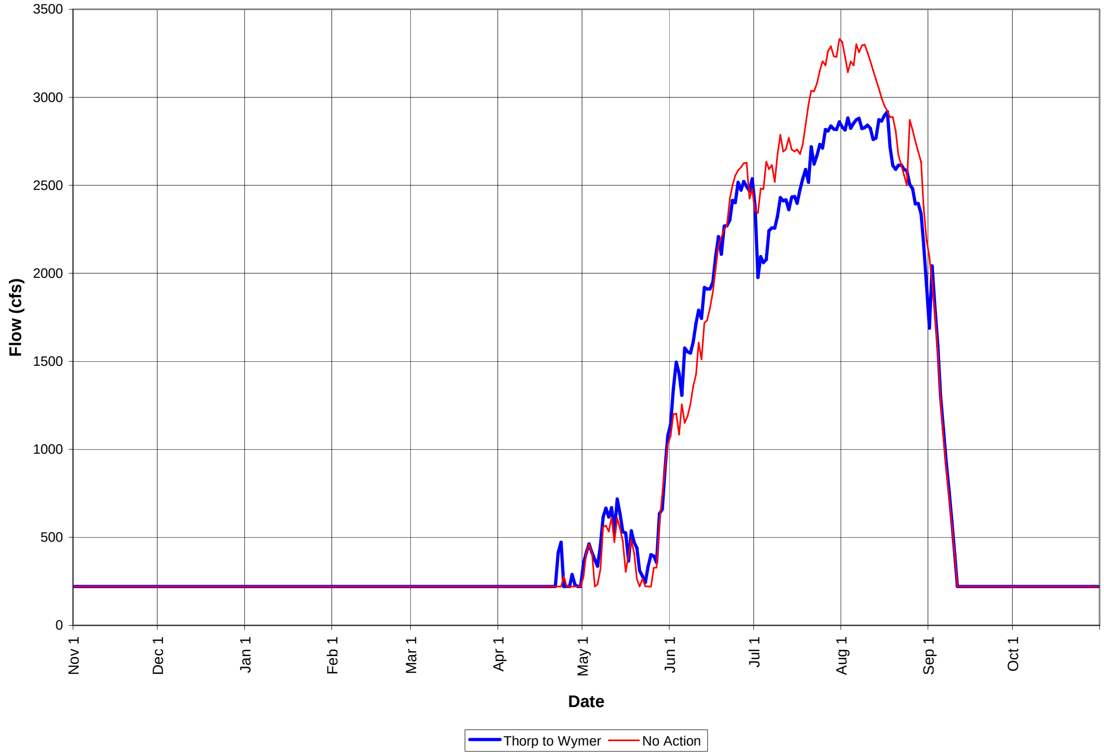


Figure 5-22 Cle Elum River below Cle Elum Dam Flow – Drought Year 1994 for Wymer Reservoir

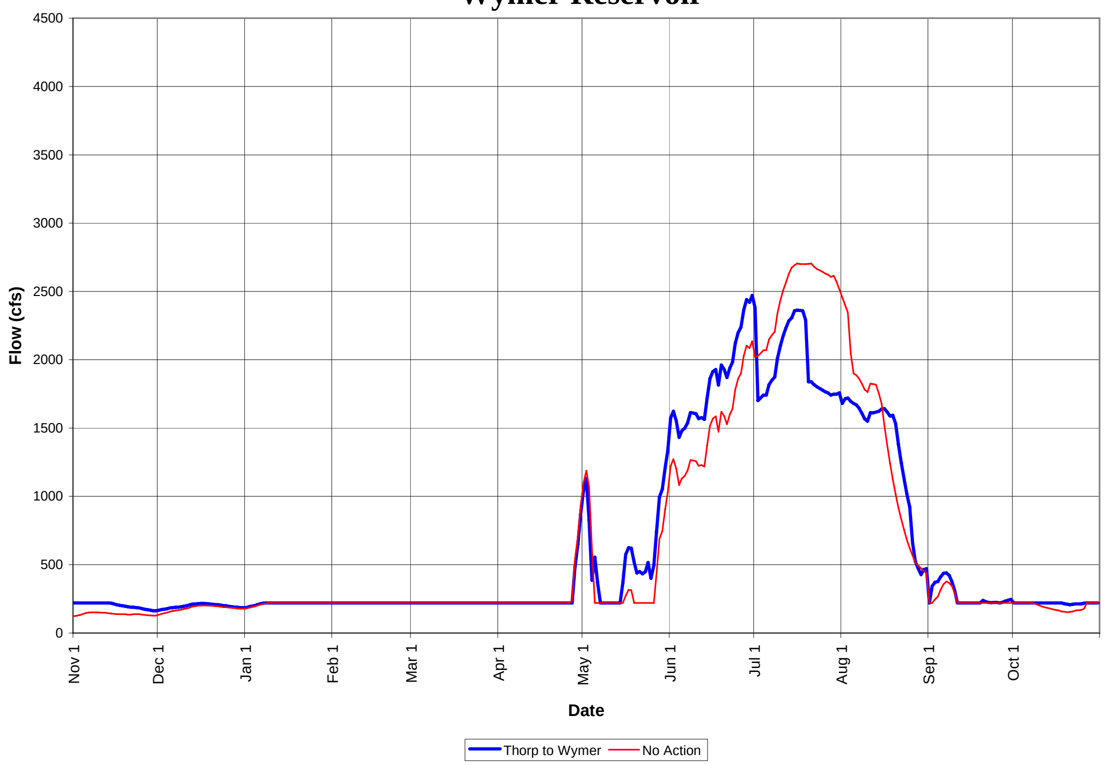


Figure 5-23 Cle Elum River below Cle Elum Dam Flow – Drought Year 2001 for Wymer Reservoir

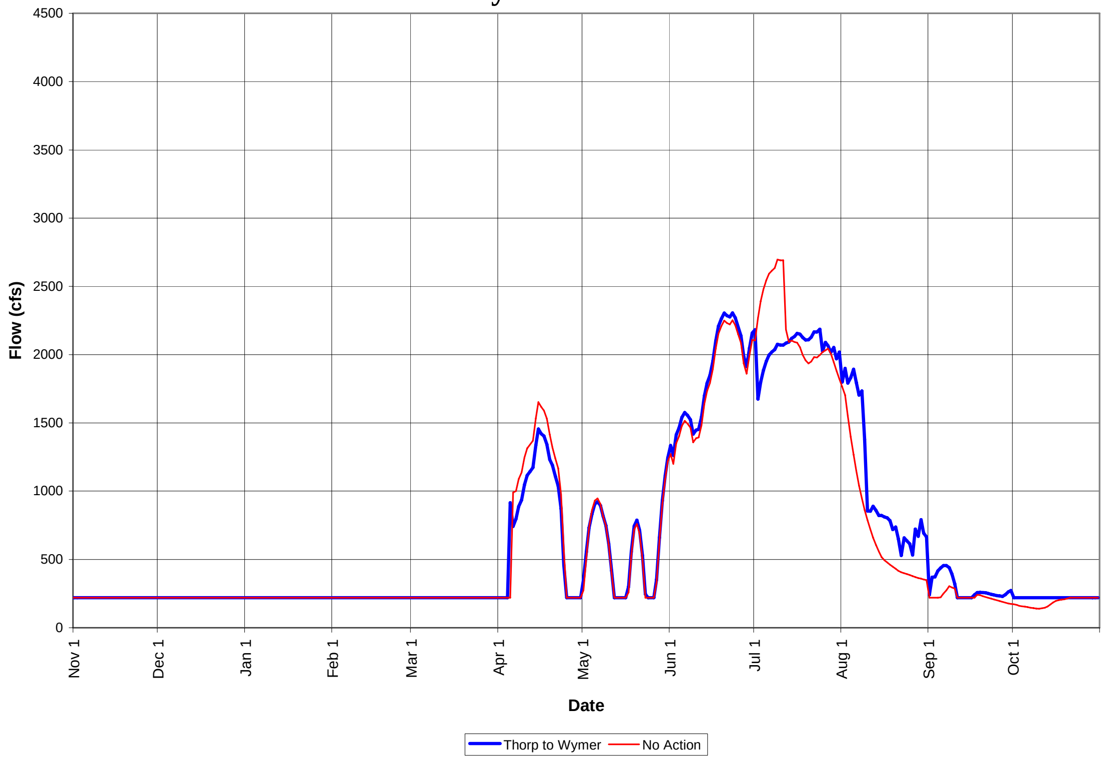
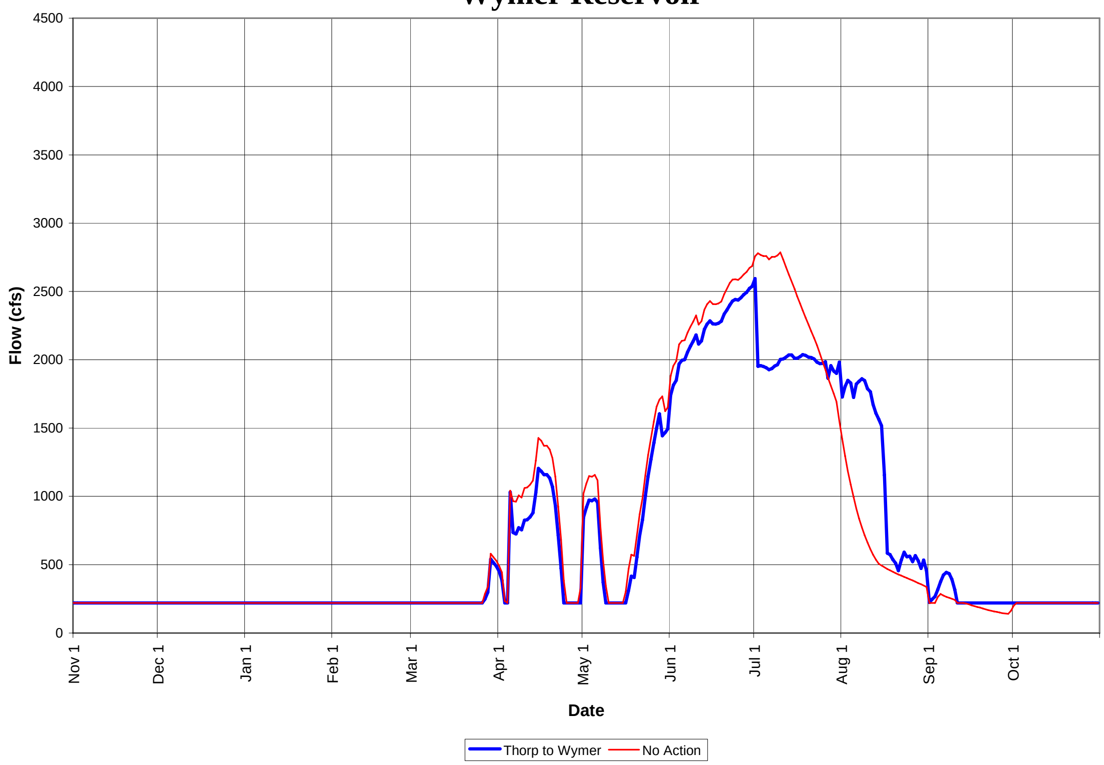


Figure 5-24 Cle Elum River below Cle Elum Dam Flow – Drought Year 2005 for Wymer Reservoir



The Wymer Reservoir – Thorp to Wymer Option would decrease flow in the Cle Elum River in the summertime in most years. The flow is reduced by approximately 500 cfs in July and half of August. During drought years, there is less difference in flows, primarily as flows are reduced anyway because of the water shortage and reduced deliveries to KRD.

Yakima River Flow at Umtanum Gage

Flow in the Yakima River at Umtanum is currently lower than unregulated flow in spring and higher than unregulated flow in summer due to storage and releases for irrigation water supply. Figure 5-25 shows a comparison of median flow for the Yakima River at Umtanum between the No Action Alternative and the Wymer Reservoir – Thorp to Wymer Option. Figures 5-26 through 5-28 show a comparison of flow for the Yakima River at Umtanum for drought years 1994, 2001, and 2005, respectively.

Figure 5-25 Yakima River at Umtanum – Median Flow for Wymer Reservoir

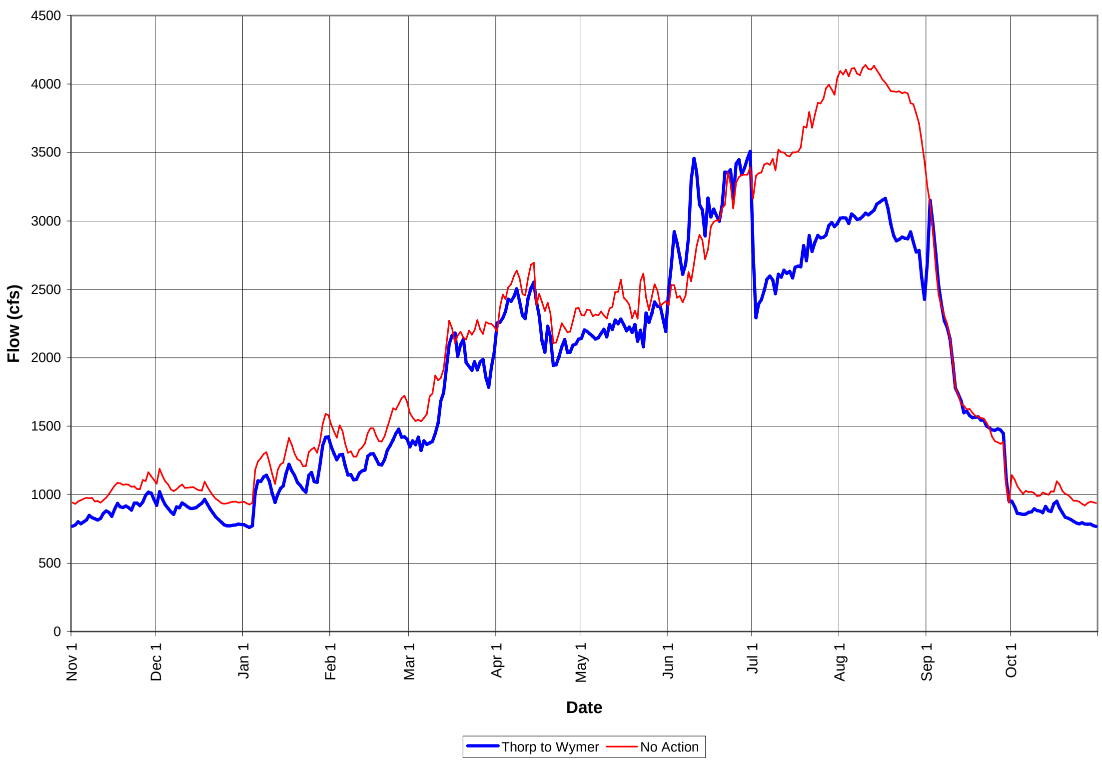


Figure 5-26   Yakima River at Umtanum Flow – Drought Year 1994 for Wymer Reservoir

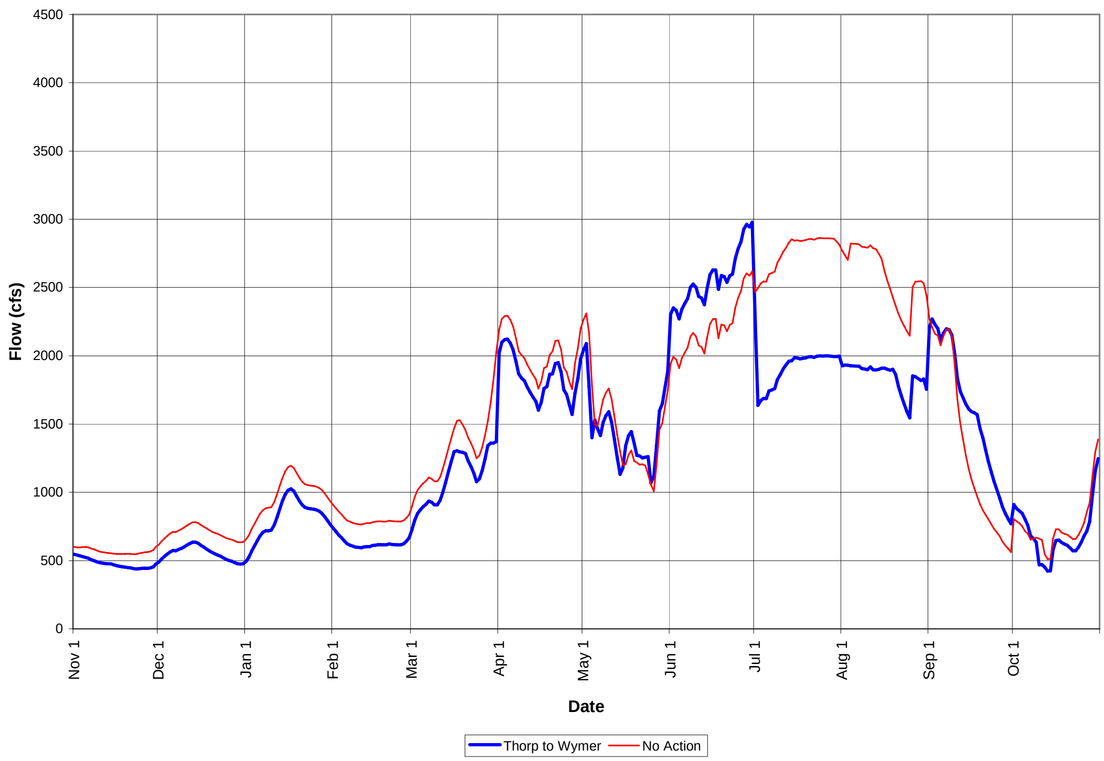


Figure 5-27   Yakima River at Umtanum Flow – Drought Year 2001 for Wymer Reservoir

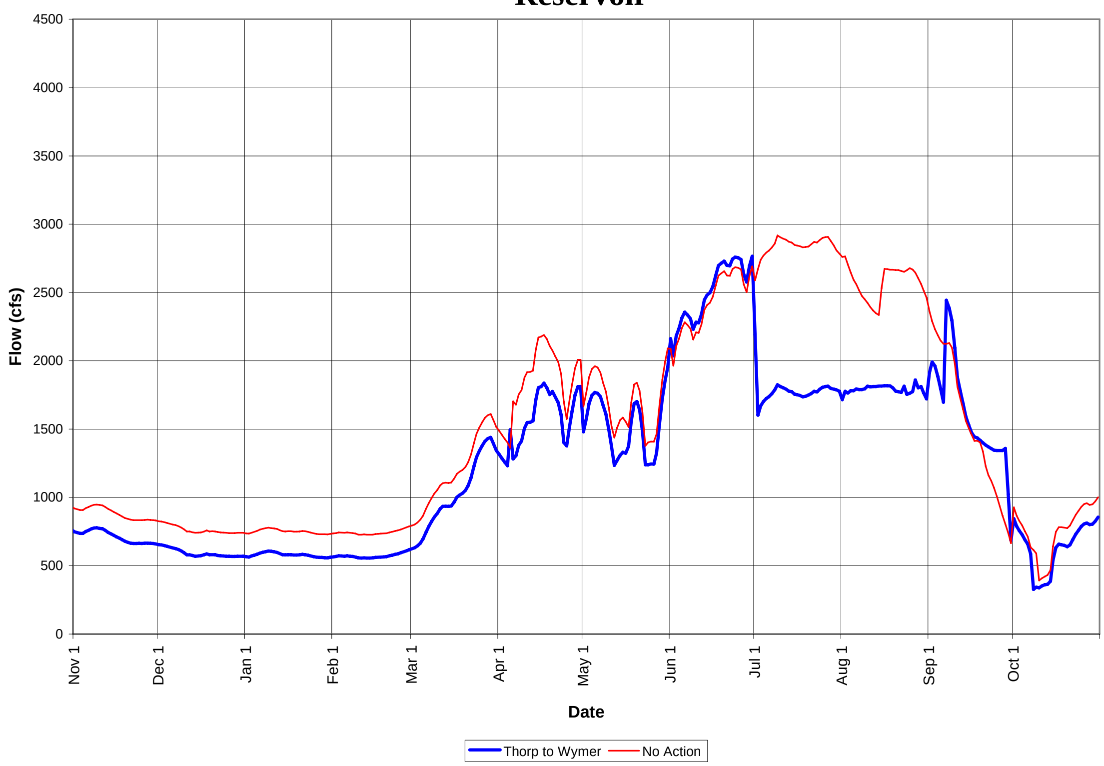
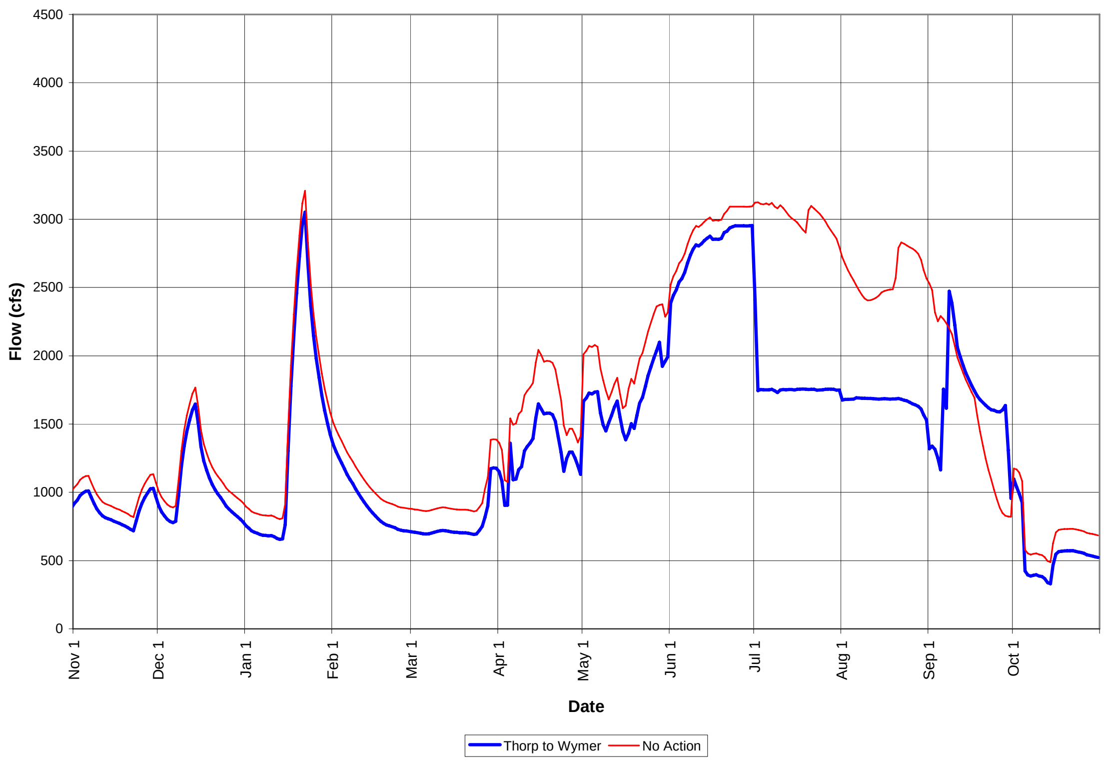


Figure 5-28 Yakima River at Umtanum Flow – Drought Year 2005 for Wymer Reservoir



As shown in Figure 5-25, flow in the Yakima River at Umtanum is slightly reduced during winter and spring months and greatly reduced during summer months by the Wymer Reservoir – Thorp to Wymer Option compared to the No Action Alternative. The summer reduction of approximately 1,000 cfs is a large improvement and helps address the issue of high flows in this reach of the Yakima River.

A similar pattern of effects also occurs during drought years.

Yakima River Flow at Parker Gage

Flow in the Yakima River at Parker is currently much lower than unregulated flow in spring and summer due to storage and diversions for irrigation water supply. Figure 5-29 shows a comparison of median flow for the Yakima River at Parker between the No Action Alternative and the Wymer Reservoir – Thorp to Wymer Option. Figures 5-30 through 5-32 show a comparison of flow data for the Yakima River at Parker for drought years 1994, 2001, and 2005, respectively.

Figure 5-29 Yakima River at Parker Quartile Flow Data for Wymer Reservoir

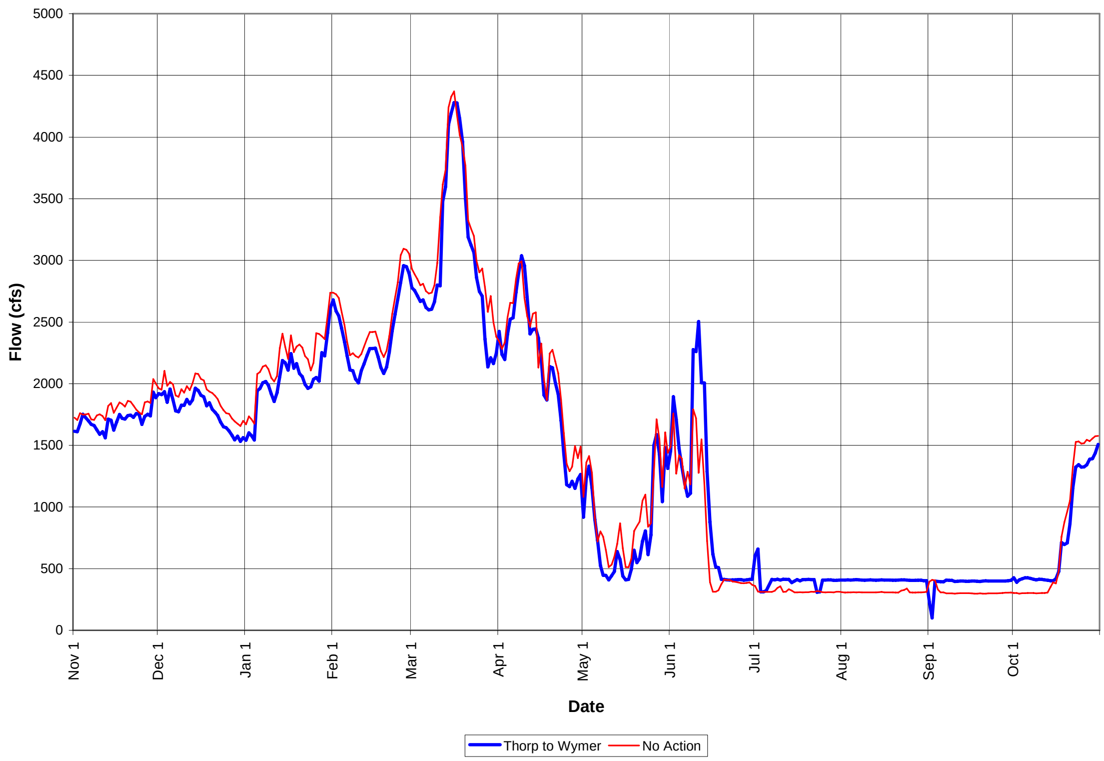


Figure 5-30 Yakima River at Parker Flow – Drought Year 1994 for Wymer Reservoir

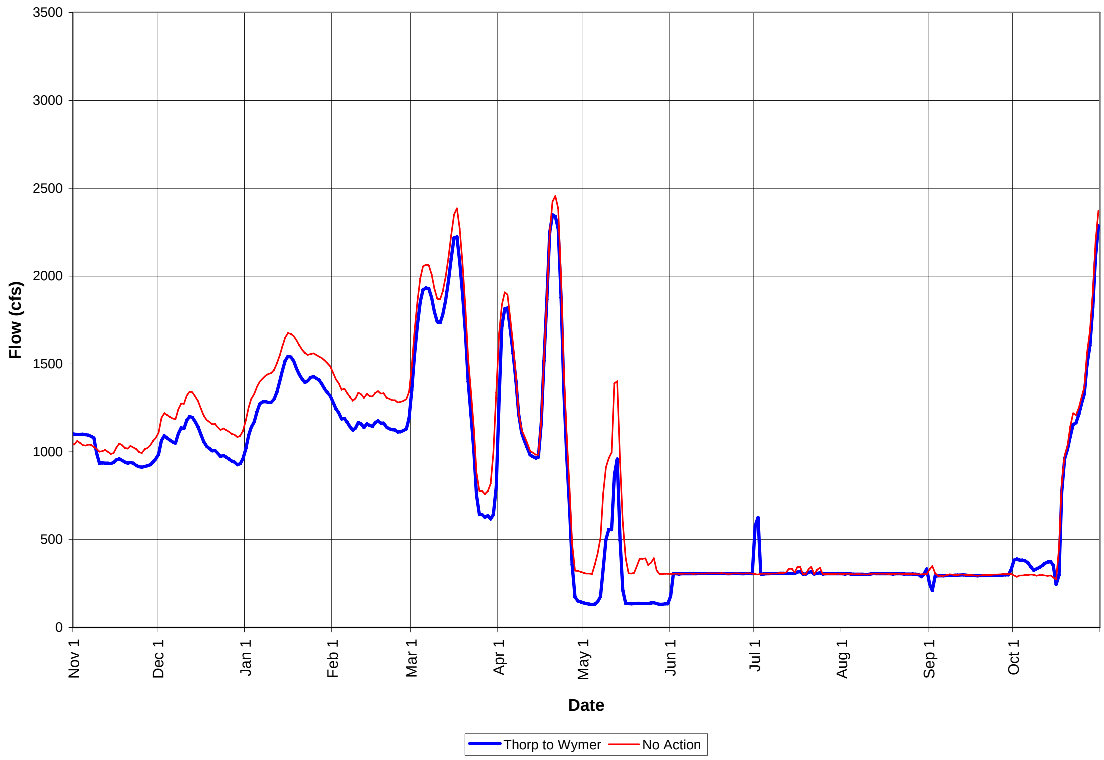


Figure 5-31 Yakima River at Parker Flow – Drought Year 2001 for Wymer Reservoir

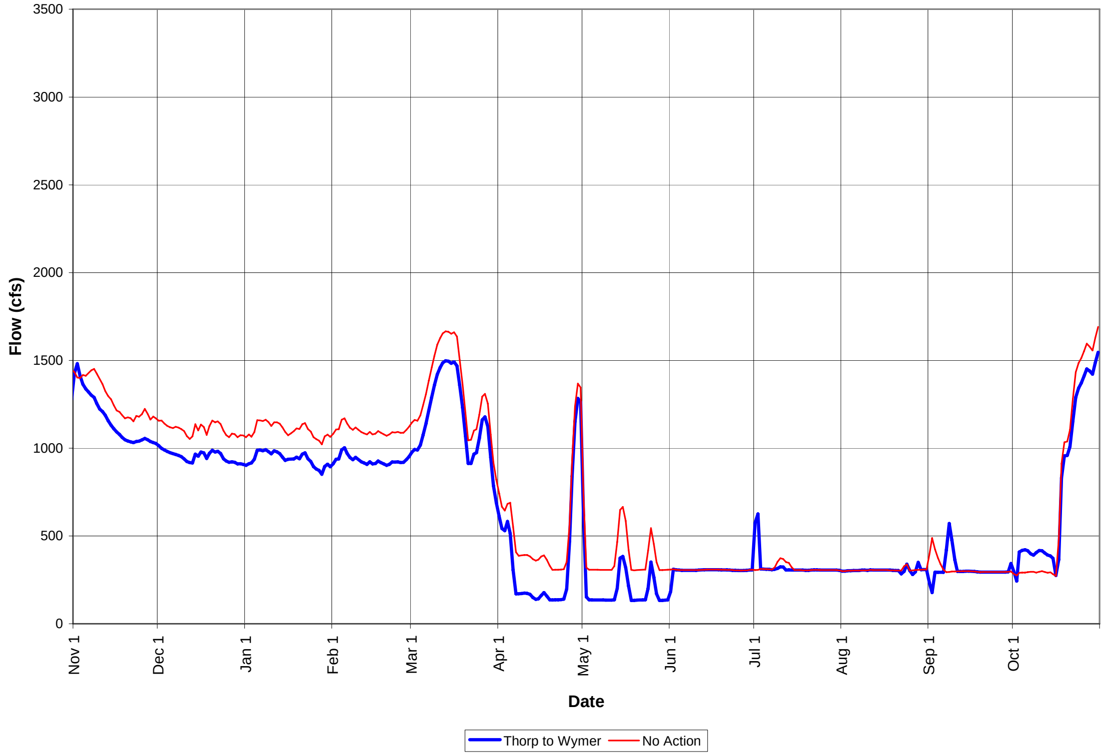
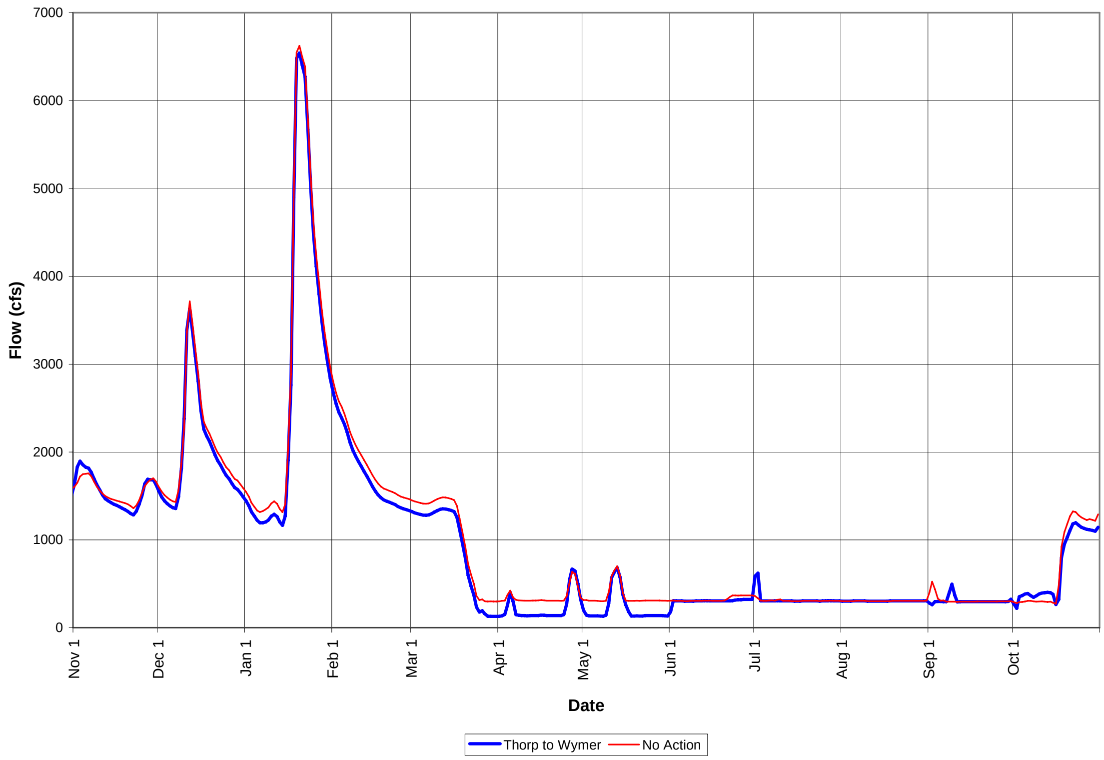


Figure 5-32 Yakima River at Parker Flow – Drought Year 2005 for Wymer Reservoir



It appears that very little effect on flow occurs at the Parker gage from the Wymer Reservoir – Thorp to Wymer Option for all years. Some differences exist but no general conclusion could be made as to its effects on flow at Parker.

Naches River Flow near Naches

The Naches River near Naches has mostly unregulated flow but is also influenced by Bumping Lake and Rimrock Lake operations. Currently, flow is lower than unregulated flow in the spring and much higher than unregulated flow during September and October due to irrigation releases and the flip-flop operation. Figure 5-33 shows a comparison of median flow at the Naches River near Naches gage between the No Action Alternative and the Wymer Reservoir – Thorp to Wymer Option. Figures 5-34 through 5-36 show a comparison of flow at the Naches River near Naches for drought years 1994, 2001, and 2005, respectively.

Figure 5-33 Naches River near Naches – Median Flows for Wymer Reservoir

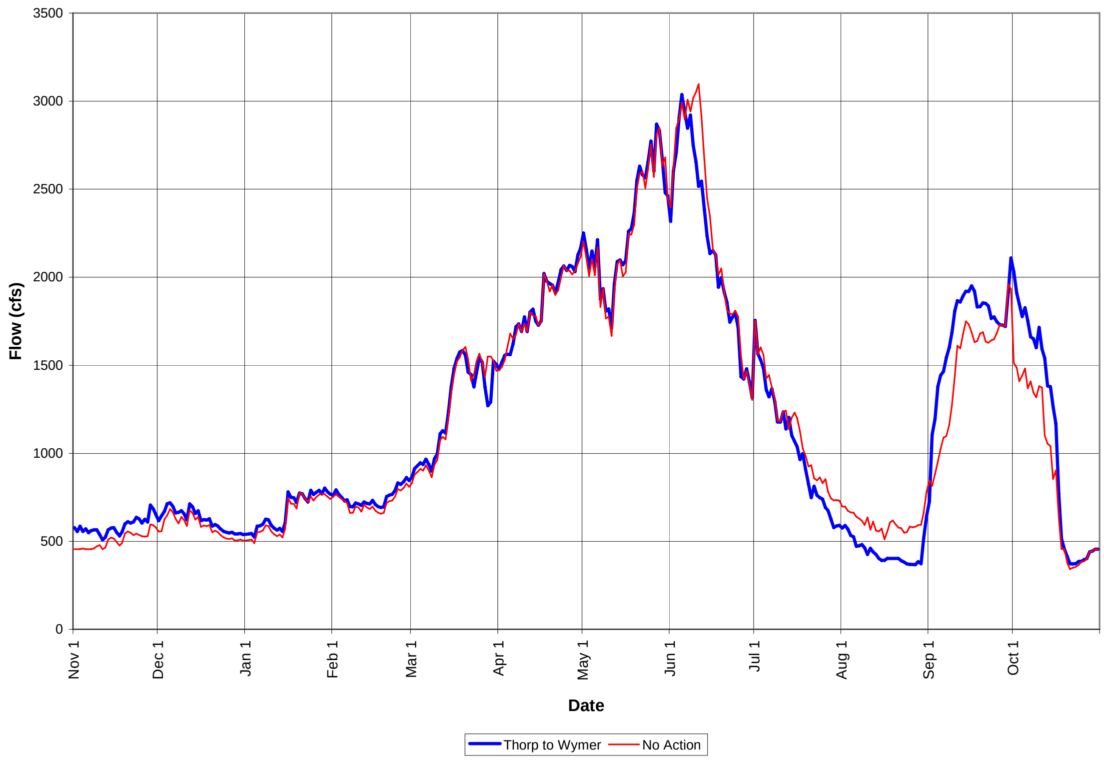


Figure 5-34 Naches River near Naches Flow – Drought Year 1994 for Wymer Reservoir

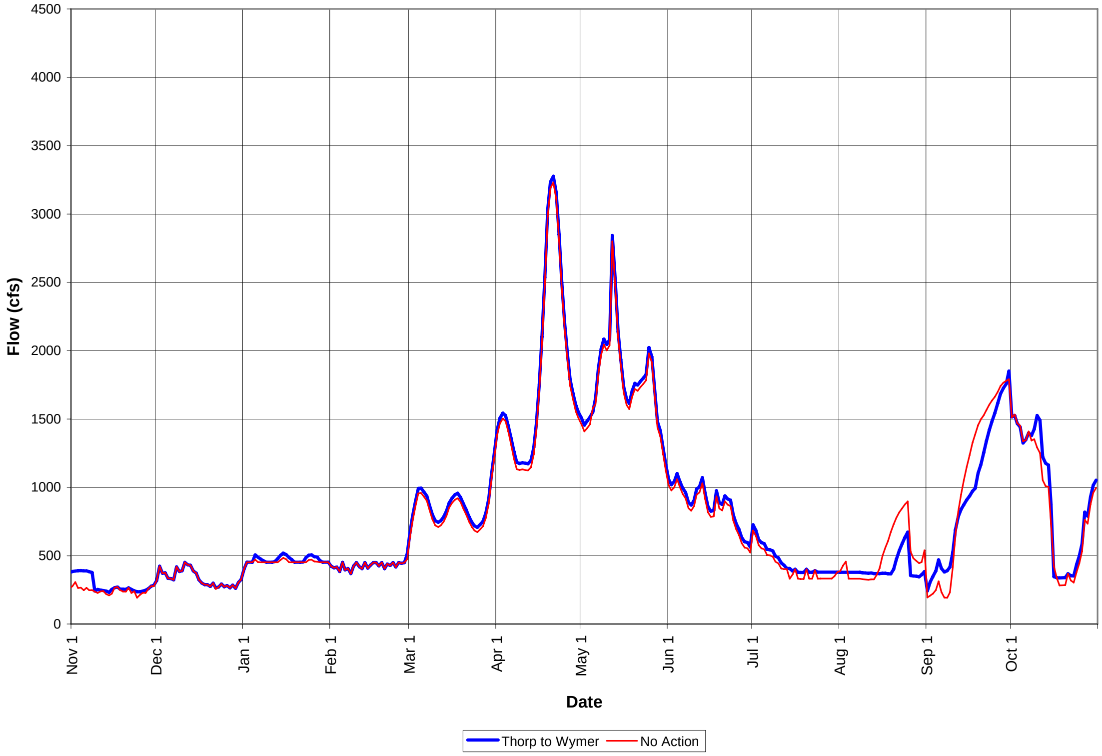


Figure 5-35 Naches River near Naches Flow – Drought Year 2001 for Wymer Reservoir

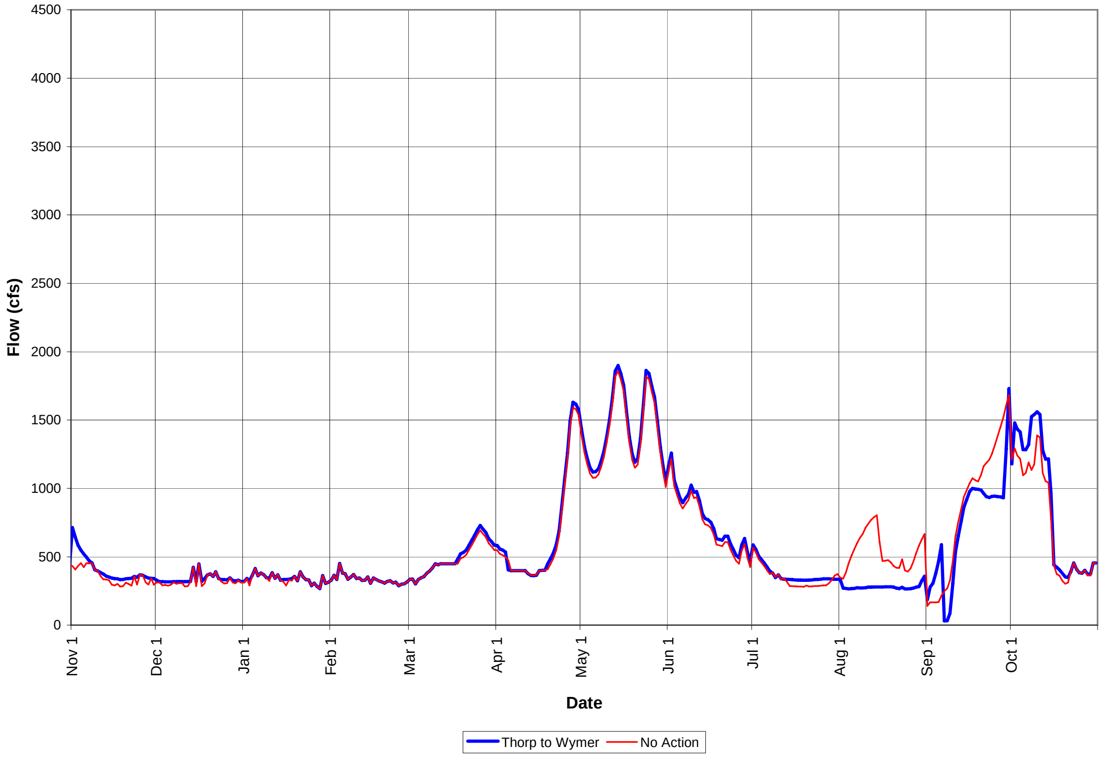
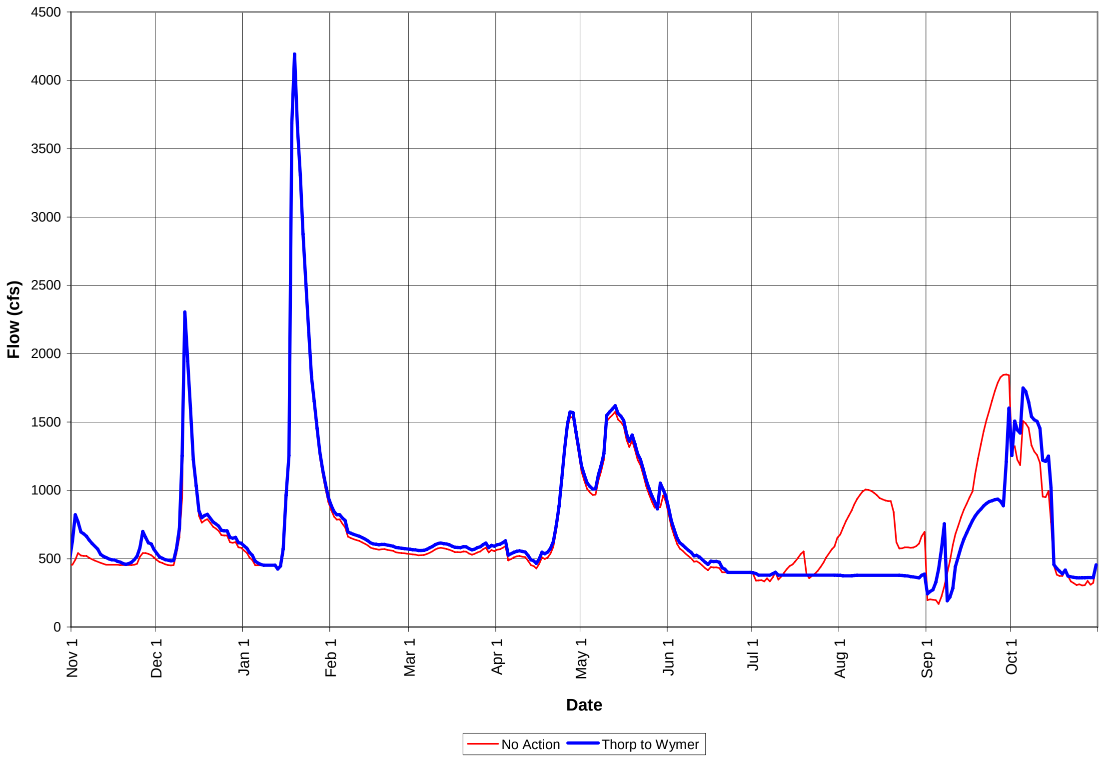


Figure 5-36 Naches River near Naches Flow – Drought Year 2005 for Wymer Reservoir



No significant change would occur in Naches River flows as a result of the Wymer Reservoir. No reduction in flip-flop operations would result.

Hydrologic Indicators

Hydrologic indicators are used to show the effects an alternative has on the Yakima Project water supply over the 25-year hydrologic modeling period. Table 5-14 shows the changes in hydrologic indicators between the No Action Alternative and the Wymer Reservoir – Thorp to Wymer Option.

Table 5-14 Hydrologic Indicators of Wymer Reservoir – Thorp to Wymer Option Compared to No Action Alternative

Hydrologic Indicator	No Action Alternative				Wymer Reservoir – Thorp to Wymer Option			
	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005
April 1 TWSA (maf)	2.82	1.75	1.80	1.76	2.91	1.89	1.95	1.82
April-September flow volume at Parker gage (kaf)	506	188	131	119	502	167	109	102
April-September diversion volume upstream of Parker gage (maf)	2.02	1.48	1.59	1.56	2.14	1.71	1.81	1.68
September 30 non-Wymer reservoir contents (kaf)	266	67	76	99	325	75	173	189
September 30 Wymer reservoir contents (kaf)	-	-	-	-	73	8	8	8
April-September flow volume at mouth of Yakima River (kaf)	847	322	250	283	845	312	240	271
Irrigation proration level (percent)	85%	28%	40%	38%	90%	42%	53%	43%

April 1 TWSA

The April 1 TWSA would be increased by the Wymer Reservoir – Thorp to Wymer Option compared to the No Action Alternative. The April 1 TWSA is increased by 3.2 percent on average for the period modeled (1981-2005). In 1994 and 2001, the April 1 TWSA increased by about 8 percent, and in 2005, the April 1 TWSA increased by 3.4 percent.

April-September Yakima River Flow Volume at Parker

The modeling indicates the April-September flow volume in the Yakima River at Parker would be slightly reduced (up to 22 kaf); however, the result is likely due to modeling issues. The September 30 reservoir storage is much greater (up to 97 kaf) with the project. Additional flow could be released to at least meet current flow in the April-September time period and still have greater reservoir storage volumes.

April-September Diversion Volume Upstream of the Parker Gage

The diversion volume upstream of Parker from April-September would be increased with the Wymer Reservoir – Thorp to Wymer Option compared to the No Action Alternative.

September 30 Reservoir Contents

The September 30 reservoir contents are predicted to increase for existing reservoirs with the operation of Wymer Reservoir and their contents combined with Wymer Reservoir would increase the total Yakima River basin storage by up to 105,000 acre-feet in drought years at the end of September.

Table 5-15 presents a comparison of reservoir storage on March 31, June 30, and September 30 for the Wymer Reservoir – Thorp to Wymer Option and the No Action Alternative.

Table 5-15 Yakima Project Reservoir Contents (kaf)

Date – Reservoir	No Action Alternative				Wymer Reservoir – Thorp to Wymer Option			
	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005
March 31 – Wymer	-	-	-	-	144	72	150	150
March 31 – All others	602	206	345	630	622	266	414	609
June 30 – Wymer	-	-	-	-	160	92	132	132
June 30 – All others	909	564	578	636	886	543	596	605
Sept 30 – Wymer	-	-	-	-	73	8	8	8
Sept 30 – All others	266	67	76	99	325	75	173	189

April-September Yakima River Flow Volume at Mouth

Very little change in April-September flow volumes in the Yakima River at its mouth are predicted to occur.

Irrigation Proration Level

The irrigation proration level would increase with the 80,000 acre-feet additional storage that is available from Wymer Reservoir for irrigation.

Seasonal Flow Volume Objectives

Table 5-16 presents the seasonal flow volume objectives for the Yakima River at Umtanum and Parker gages. Seasonal flow volume objectives are developed from unregulated flow regimes for the Yakima, Naches, Cle Elum, Bumping, and Tieton Rivers. Table 5-16 also presents the average seasonal flow volumes for the Yakima River at Umtanum and Parker gages for the Wymer Reservoir – Thorp to Wymer Option as well as the No Action Alternative.

Table 5-16 Seasonal Flow Volumes for Wymer Reservoir

Alternative	Umtanum Flows (maf)			Parker Flows (maf)		
	Spring	Summer	Winter	Spring	Summer	Winter
Objective	0.636	0.298	0.280	0.717	0.309	0.490
No Action	0.676	0.620	0.380	0.659	0.138	0.696
Wymer Reservoir – Thorp to Wymer Option	0.662	0.411	0.348	0.641	0.139	0.670

Notes: Spring – March-June; the desired outcome is to meet or exceed the flow objective volume
Summer – July-October; the desired outcome is to not exceed, but not fall too far below the flow objective volume
Winter – November-February; the desired outcome is to meet or exceed the flow objective volume

The Wymer Reservoir – Thorp to Wymer Option would not significantly change the average seasonal flows.

Comparison of Effects for Other Wymer Reservoir Options

South Branch Option

The major difference in impacts to surface water from the South Branch Option is that flow would be supplied from Cle Elum Dam, reducing the volume of water that could be used to fill Wymer compared to the option with a pump station at Thorp. Flows in the Cle Elum River would be different also, with reduced flows in winter, spring and summer.

Pipeline Option

The Pipeline Option would have similar operations and impacts as the South Branch Option.

Summary of Impacts

An analysis of impacts to flows was made for Wymer Reservoir assuming the Thorp to Wymer Option would be constructed. The analysis illustrates the potential benefit or impact to the flow regime for winter, spring, and summer flows in the reaches of the Yakima River, Naches River, and tributaries described in Chapter 3. The main changes identified to the flow regime are:

- Increased flow in the upper Yakima River from Easton to Thorp;
- Decreased flow in the Cle Elum River during summer; and

- Decreased flow in the summer in the reach of the Yakima River between Thorp and the Wymer Reservoir.

Water supplies would benefit from the additional reservoir storage provided for drought years. The benefits and impacts are illustrated in Table 5-17 for the upper, middle, and lower Yakima River.

Table 5-17 Summary of Impacts to Flow by New Storage Element (Wymer Dam plus Direct Feed from Canal or Pipeline) – Upper, Middle, and Lower Yakima River

Season	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Winter (Oct-March)	○	▪	○	▪	▪	○	○	○	◒	○	○	○	○	○	○	○
Spring (April-June)	○	▪	○	▪	▪	○	○	○	○	◒	○	○	○	○	○	○
Summer (July-Sept)	○	▪	○	▪	▪	○	○	○	●	●	○	○	○	○	○	○

Season	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Winter (Oct-March)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spring (April-June)	◒	○	○	○	○	○	○	○	◒	◒	○	○	◒	◒	◒	○	○	◒	◒
Summer (July-Sept)	◒	○	○	○	○	◒	◒	○	◒	◒	○	○	◒	◒	◒	○	○	◒	◒

Symbol	
●	High Benefit
◒	Medium Benefit
▪	Low Benefit
○	No Change or Benefit

Tributary Storage Surrogate: Ahtanum Creek Watershed Restoration Program, Including Pine Hollow Reservoir

The effects on surface water were previously presented in detail in Section 6.2.2 of Ecology's 2005 Final Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005a).

Overall, the Pine Hollow reservoir component of the Ahtanum Creek Watershed Restoration Program would store and distribute approximately 15,000 acre-feet annually to meet irrigation demand and augment instream flows. Currently, the shut-off date for the Ahtanum Irrigation District is July 10; the Ahtanum Creek Watershed Restoration Program would allow the irrigation season to be extended beyond this date. Supplemental irrigation sources would still be required to meet the total irrigation demand within the Ahtanum basin (Ecology, 2005a). See Section 5.4.2.3 for a discussion of water rights issues associated with Pine Hollow reservoir.

During dry years, Pine Hollow reservoir would likely not fill, so little additional water would be available to supplement irrigation or instream flows. If the dry year was preceded by a wet year, however, some carry-over water may be available during the early part of the year (Ecology, 2005a).

5.3.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on surface water resources were described in Section 5.2.3.3 of the January 2008 Draft Planning Report/EIS for surface recharge and municipal ASR.

The analysis of the regional ASR program in Ecology (2009a) assumed a diversion of approximately 65,000 acre-feet (2,500 gpm per well; 274 cfs per wellfield) over a 120 day period per wellfield; however, the actual wellfield volumes will be determined based on water availability, additional field investigations and hydraulic analysis.

Large volumes of spring run-off would be captured prior to the irrigation season and stored it in deep basalt aquifers that have a high recovery efficiency. The diversion would reduce stream flow in the Yakima River during the spring and would only occur when there is water available over and above any existing entitlements (including Title XII stream flows).

The water stored during the early spring would be pumped out during the summer. The water would be pumped into the existing and/or modified canal system for irrigation use. The recovered water would not directly increase stream flows but could reduce irrigation diversions in the Yakima Project. The wellfields could be operated year-after-year to increase the total water supply or only during dry or drought conditions to satisfy junior water rights.

5.3.2.5 Fish Habitat Enhancement Element

This element contains a number of projects that may improve flow conditions in the mainstem Yakima and Naches Rivers and tributaries by providing a more natural floodplain and increased habitat complexity. The projects may reduce flood peaks by providing additional floodplain storage and reduce velocities in stream channels by providing additional off-channel conveyance areas.

5.3.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on surface water resources were described in Section 5.2.3.1 of the January 2008 Draft Planning Report/EIS.

5.3.2.7 Market-based Reallocation of Water Resources Alternative

The impacts of the Market-based Reallocation of Water Resources Element on surface water resources were described in Section 5.2.3.2 of the January 2008 Draft Planning Report/EIS.

5.3.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Implementing the elements of the Integrated Water Resource Management Alternative in an integrated way would have wide-scale geographic and temporal benefits on flows throughout the Yakima River basin. It would also improve water supply for irrigation and municipal water users.

Reservoir Storage Capacity

The Integrated Water Resource Management Alternative would increase the capacity of Bumping Lake from 33,700 acre-feet to 458,000 acre-feet and add Wymer Reservoir with an active storage capacity of 162,500 acre-feet. Table 5-18 describes the water storage capacity in reservoirs before and after the Integrated Water Resource Management Alternative.

Table 5-18 Water Storage Capacity in Yakima Project Reservoirs – Integrated Water Resource Management Alternative

Storage Location (Reservoirs)	Before Integrated (acre-feet)	After Integrated (acre-feet)
Upper Yakima—Keechelus, Kachess, Cle Elum, Wymer	833,700	996,200
Naches Arm—Bumping, Rimrock, Clear Creek	237,000	661,300
TOTAL	1,070,700	1,657,500

Hydrologic Modeling

The RiverWare model was used for hydrologic modeling of the integrated elements. For the Integrated Water Resource Management Alternative, the model includes the Bumping Lake Expansion – Large Option, Wymer Reservoir – Thorp to Wymer Option, and the Enhanced Water Conservation Element. See Section 5.3.2.3 for additional details on this model.

Modeling Assumptions

Certain modeling assumptions were made to assess the effects the integrated elements may have on surface water. These assumptions are based on the assumed operations of the Yakima Project reservoirs after the Integrated Water Resource Management Alternative has been implemented.

Bumping Lake is assumed to be expanded to a capacity of 458,000 acre-feet as described in the Bumping Lake Expansion – Large Option (Section 2.3.4.1). The starting storage volume at the beginning of the modeling time period (November 1, 1980) is assumed to be 250,000 acre-feet. All modeling assumptions made for the Bumping Lake Expansion – Large Option model (Section 5.3.2.3) are also made for the Integrated Water Resource Management Alternative model.

Wymer Reservoir is assumed to follow the Thorp to Wymer Option described in Section 2.3.4.1. All modeling assumptions made for the Wymer Reservoir – Thorp to Wymer Option (Section 5.3.2.3) are also made for the Integrated Water Resource Management Alternative model.

The Enhanced Water Conservation Element assumes that water savings from projects are either used to increase instream flow and irrigation use (for YRBWEP projects described in Section 2.3.1.1 of the Draft Planning Report/EIS) or added to the TWSA (for non-YRBWEP projects described in Section 2.3.7.2). The model assumptions for this element are the same as those made for the model results described in Section 5.2.3.3 of this EIS.

Municipal and Industrial Water Demands

Municipal and Industrial (M&I) demands were estimated in the Technical Report on the Enhanced Conservation Alternative, Ecology Publication Number 07-11-004 (Ecology, 2007). The additional year 2020 demand for the four major cities in the Yakima basin (Yakima, Ellensburg, Sunnyside, Grandview) is estimated to be 30,600 acre-feet/year. The year 2050 demand, with water conservation, is estimated to be 45,300 acre-feet/year. The demands are less than the 82,000 acre-feet/year demands described in Reclamation's EIS. The M&I demands were not placed in the hydrologic model; however, the ability of the Integrated Water Resource Management Alternative to meet those demands can be assessed from the additional quantity of water provided to proratable water users and the quantity of water remaining in storage at the end of the irrigation season. New water rights issued to municipalities would be junior to existing rights and therefore proratable during water short years.

Modeling Results

Reservoir Storage

Figure 5-37 shows the storage volume for existing reservoirs (Keechelus, Kachess, Cle Elum, and Rimrock) in the Integrated Water Resource Management Alternative compared to the No Action Alternative. Figure 5-38 shows the difference in storage volume for the existing reservoirs between the Integrated Water Resource Management Alternative and the No Action Alternative. Figure 5-39 shows the storage volume for the Bumping Lake expansion and Wymer Reservoir for the Integrated Water Resource Management Alternative.

Figure 5-37 Existing Reservoirs Storage Volume (Keechelus, Kachess, Cle Elum, and Rimrock Reservoirs)

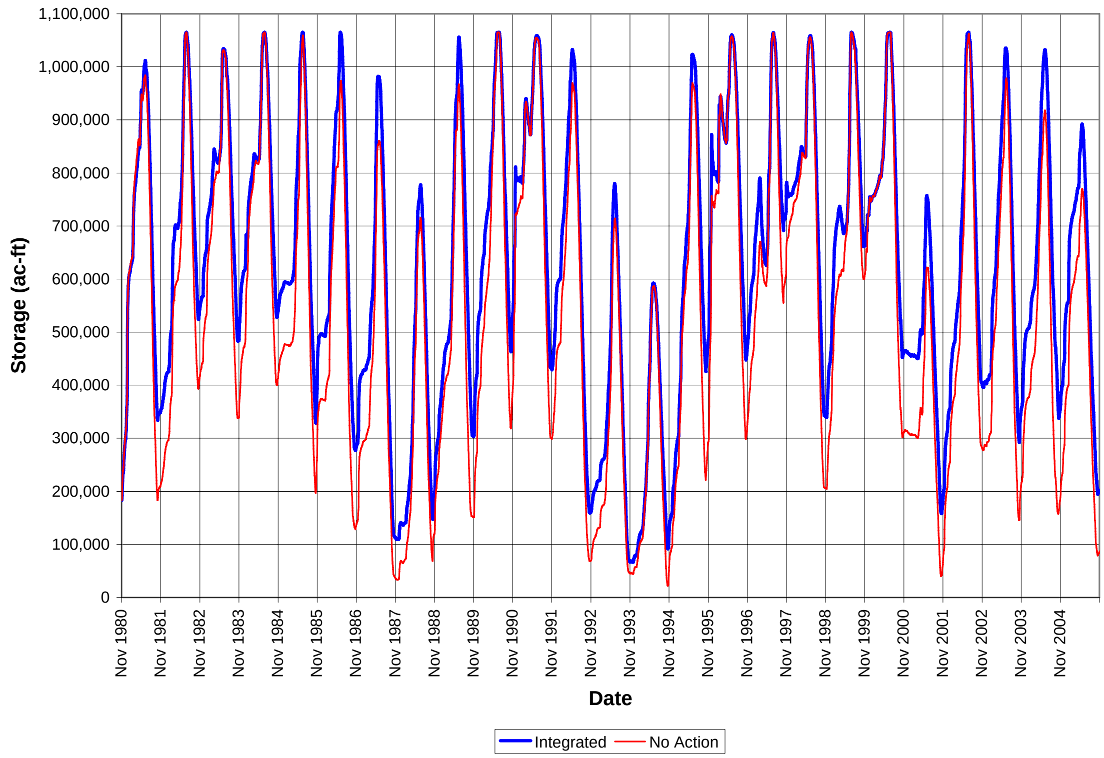


Figure 5-38 Difference in Existing Reservoirs Storage Volume (Keechelus, Kachess, Cle Elum, and Rimrock Reservoirs)

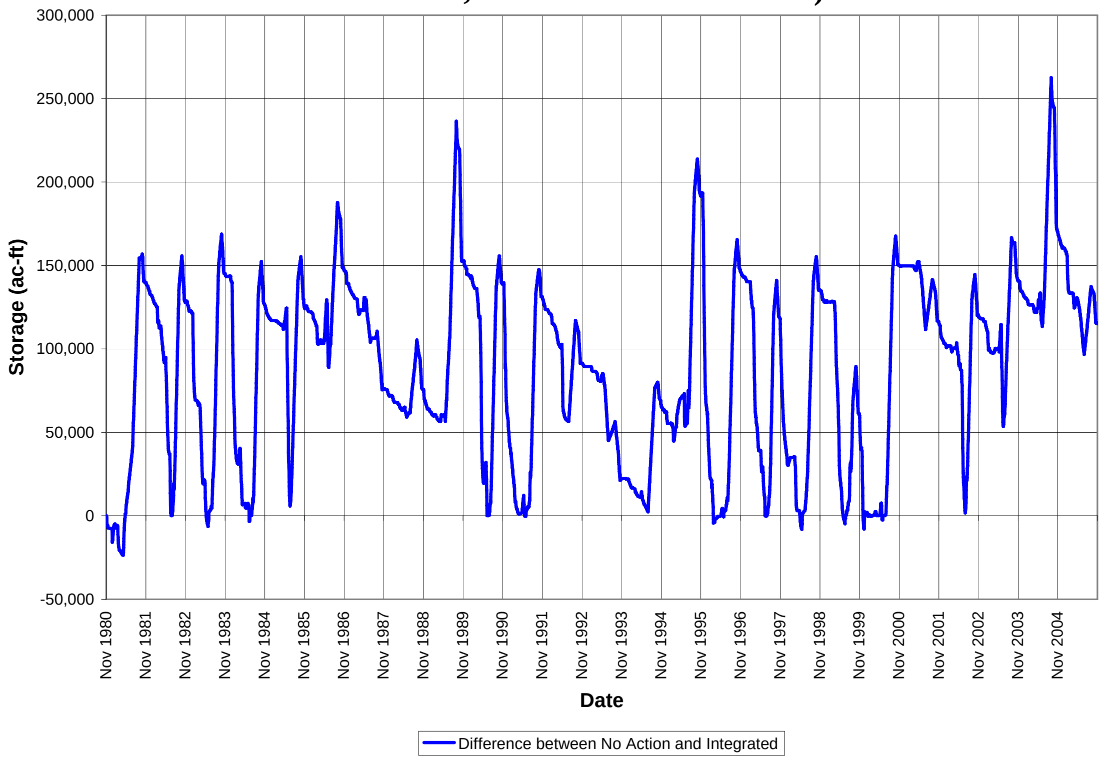
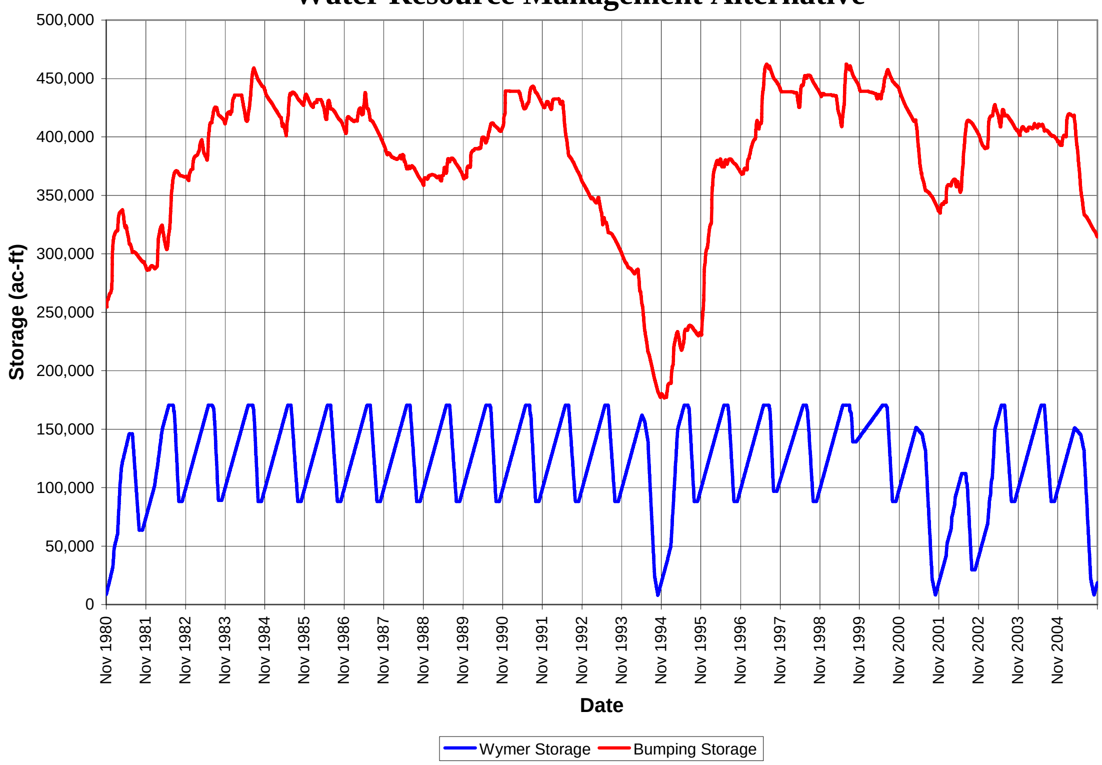


Figure 5-39 Bumping Lake and Wymer Reservoir Storage Volume for Integrated Water Resource Management Alternative



Figures 5-38 and 5-39C show that the Integrated Water Resource Management Alternative would provide a large increase in the volume of water stored for all years modeled, including drought years.

Irrigation Supply

Table 5-19 shows the model results of irrigation diversion volumes to Roza Irrigation District (Roza), Kittitas Reclamation District (KRD), Sunnyside Valley Irrigation District (Sunnyside), and Wapato Irrigation Project (Wapato). These districts were chosen to give results from irrigators that rely on proratable supply only (Roza and KRD), non-proratable supply only (Sunnyside), and a combination of both proratable and non-proratable supply (Wapato). Model results include average diversion volumes (1981-2005) and diversion volumes for drought years 1994, 2001, and 2005.

Table 5-19 Roza, KRD, Sunnyside, and Wapato Irrigation Diversion Volumes

Irrigation District	Average 1981-2005 (ac-ft)		Drought Year 1994 (ac-ft)		Drought Year 2001 (ac-ft)		Drought Year 2005 (ac-ft)	
	No Action	Integrated	No Action	Integrated	No Action	Integrated	No Action	Integrated
Roza	305,412	285,769	143,055	166,539	181,745	237,162	148,304	199,253
KRD	277,607	280,420	121,852	149,326	168,065	219,483	135,254	181,211
Sunnyside	426,674	360,824	359,339	330,159	411,196	377,179	371,355	343,618
Wapato	566,896	497,252	398,933	388,528	454,412	469,075	417,186	427,243

Notes: Integrated results include effects of Enhanced Conservation, which decreases the average non-drought diversions for the districts
Roza results include Bumping Lake releases used specifically for irrigation during drought years

Table 5-19 shows that the average diversion volumes are decreased with the Integrated Water Resource Management Alternative compared to the No Action Alternative due to the effects of the Enhanced Conservation Element. Only KRD averages are increased, which is due to the increased diversions during drought years offsetting the decreased diversions from conservation. During drought years, the water supply for all districts except Wapato in 1994 increased. For Wapato, the increase in proration from increased TWSA was not higher than the savings from water conservation. However, the amount of water used by irrigators in the Wapato Project in 1994 would have increased because of the increased efficiency of their delivery system with the Integrated Water Resource Management Alternative.

Cle Elum River Flow

Cle Elum River flow below Cle Elum Dam is controlled by releases from Cle Elum Lake. Currently, the flow in the Cle Elum River is higher than unregulated flow in summer and lower than unregulated flow in winter and spring. Figure 5-40 shows a comparison of median flows in the Cle Elum River between the No Action Alternative and the Integrated Water Resource Management Alternative. Figures 5-41 through 5-43 show a comparison of flow in the Cle Elum River below Cle Elum Dam for drought years 1994, 2001, and 2005, respectively.

Figure 5-40 Cle Elum River below Cle Elum Dam – Median Flow for Integrated Water Resource Management Alternative

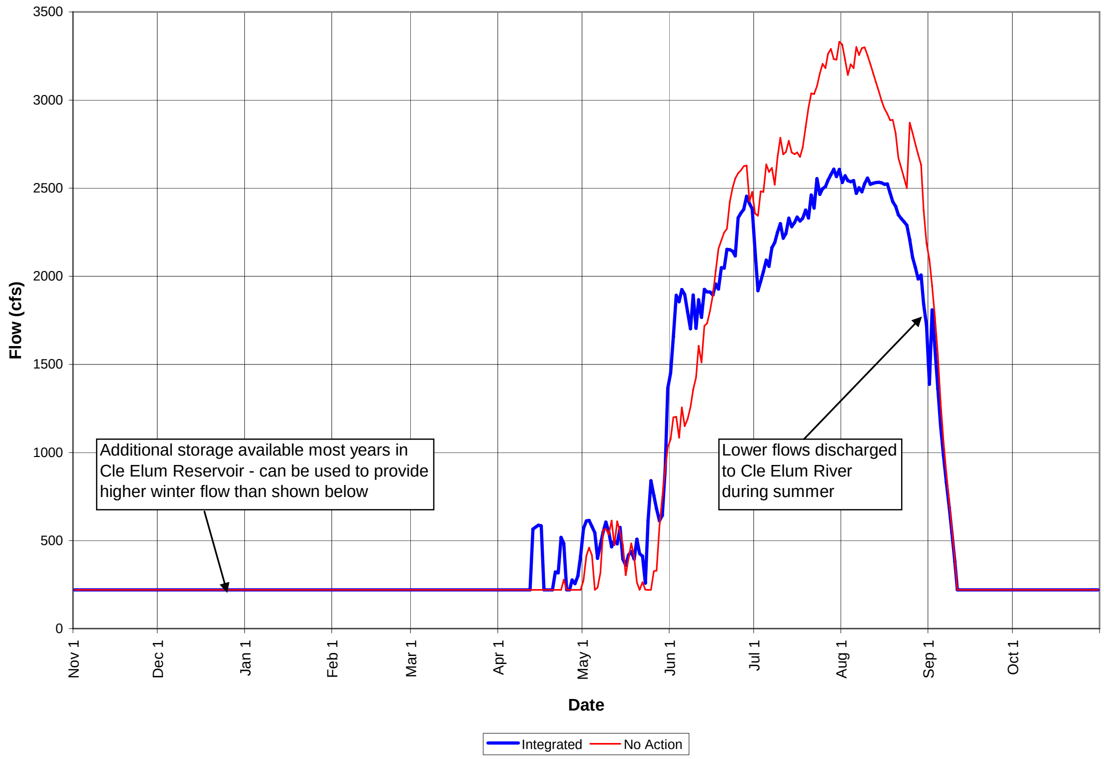


Figure 5-41 Cle Elum River below Cle Elum Dam Flow – Drought Year 1994 for Integrated Water Resource Management Alternative

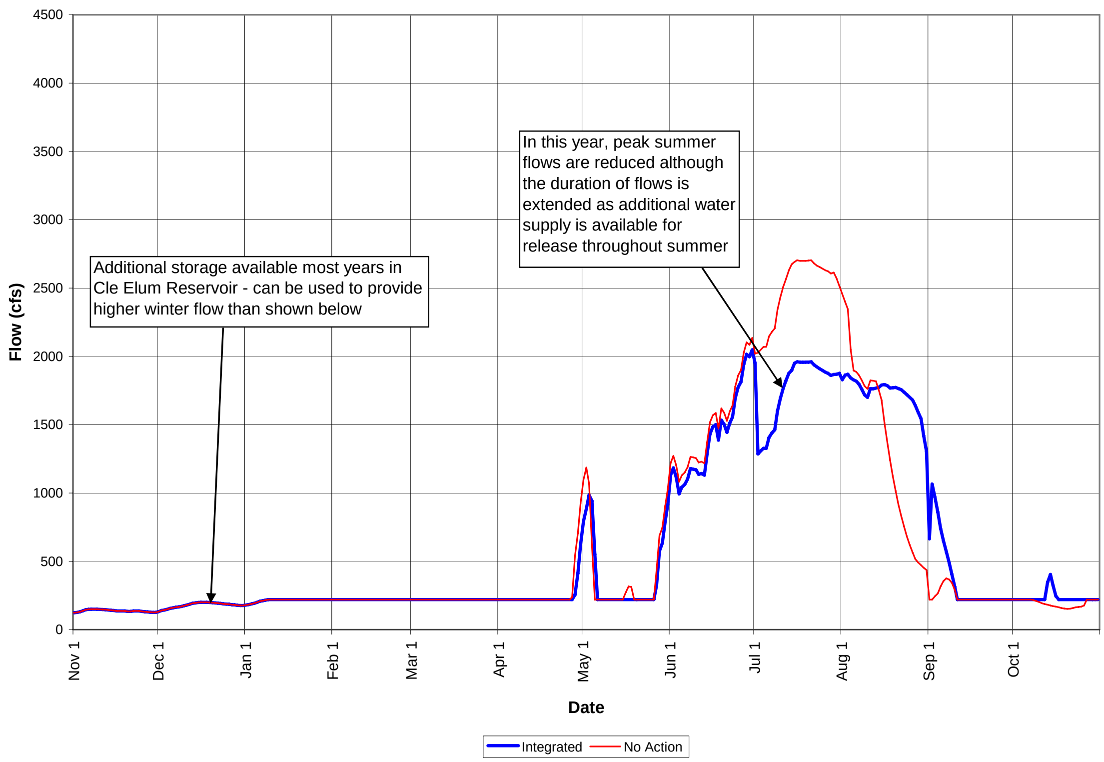


Figure 5-42 Cle Elum River below Cle Elum Dam Flow – Drought Year 2001 for Integrated Water Resource Management Alternative

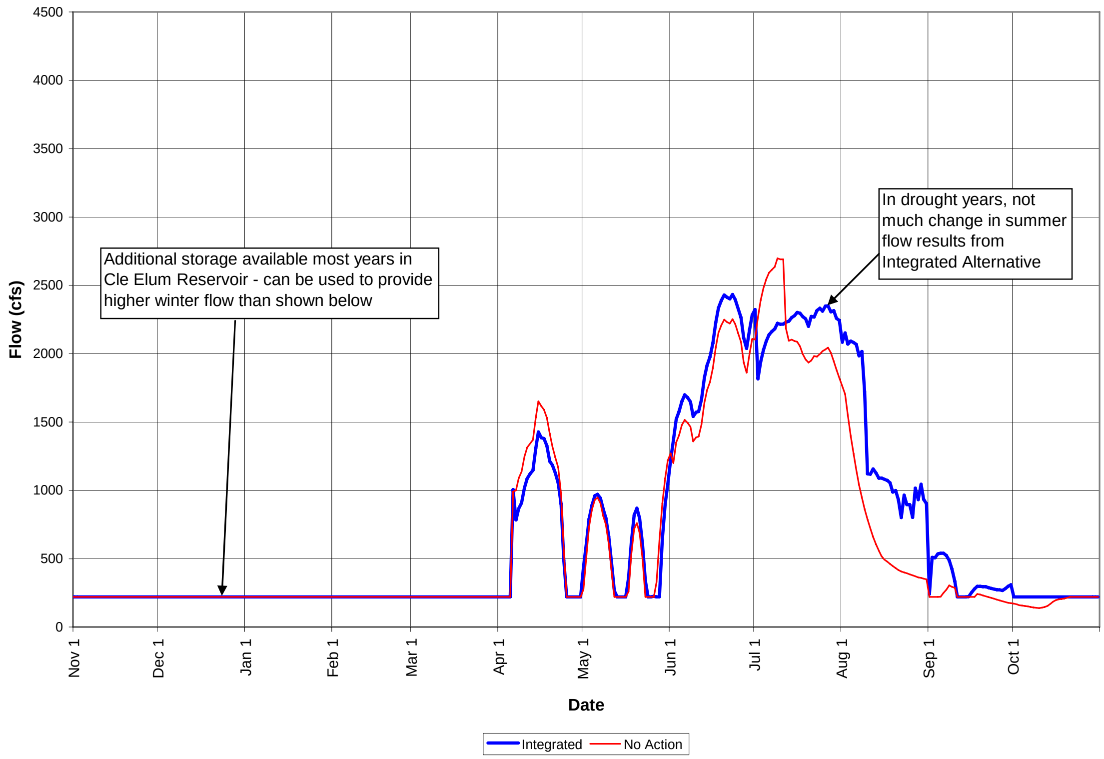


Figure 5-43 Cle Elum River below Cle Elum Dam Flow – Drought Year 2005 for Integrated Water Resource Management Alternative

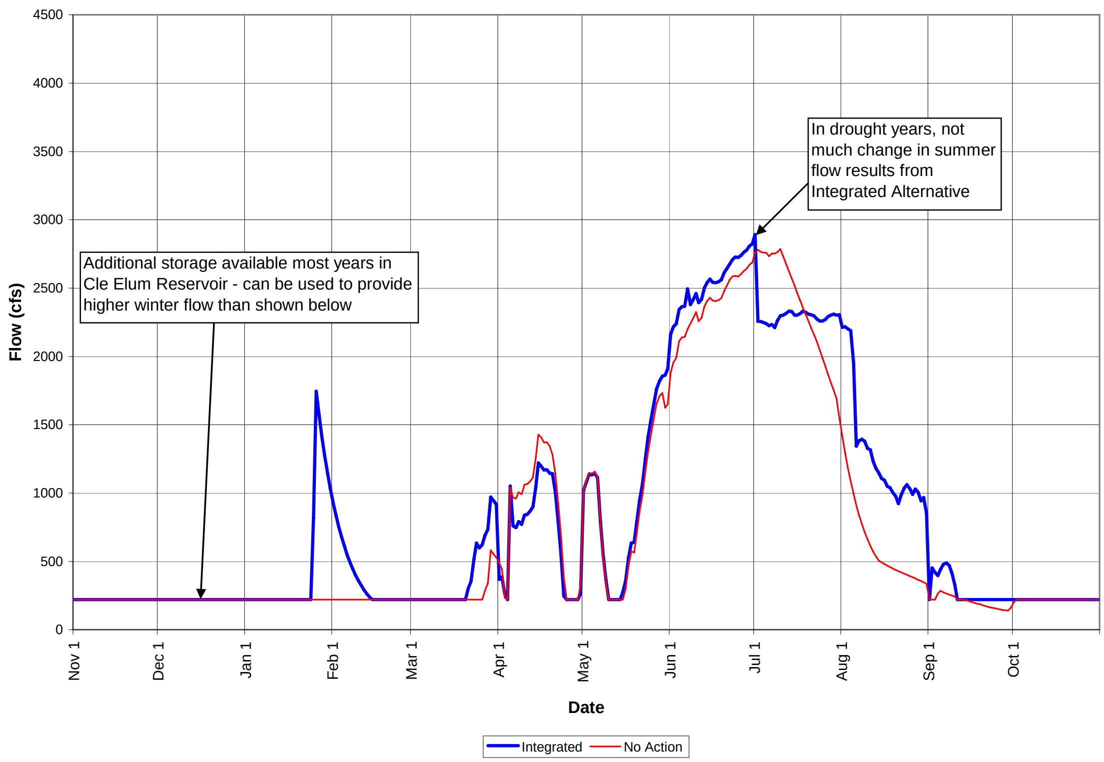


Figure 5-40 shows that lower flows, approximately 500 cfs, would be present in the Cle Elum River in July and August. The figure shows a constant discharge during fall through winter and into spring of the following season. The hydrologic model did not have additional flows released to the Cle Elum River in winter or spring; however, sufficient storage is available to increase those flows also. The additional flow could be released at a fairly constant rate or pulsed through the system when desired. A management team represented by Reclamation, Ecology, Yakama Nation, irrigators, and fish agencies would make recommendations on how much flow is desired and when it should be released.

During drought years, smaller changes in flow result from the Integrated Water Resource Management Alternative when compared to the No Action Alternative. The reason is the need to supply water to the proratable water users by releasing from Cle Elum Dam. Since there are greater volumes of water stored, the delivery to the proratables is higher and subsequently flow in Cle Elum River is higher.

Yakima River Flow at Umtanum Gage

Flow in the Yakima River at Umtanum is currently lower than unregulated flows in spring and higher than unregulated flows in summer due to storage and releases for irrigation water supply. Figure 5-41 shows a comparison of median flow for the Yakima River at Umtanum between the No Action Alternative and the Integrated Water Resource Management Alternative. Figures 5-42 through 5-44 show a comparison of flow for the Yakima River at Umtanum for drought years 1994, 2001, and 2005, respectively.

Figure 5-44 Yakima River at Umtanum Quartile Flow Data for Integrated Water Resource Management Alternative

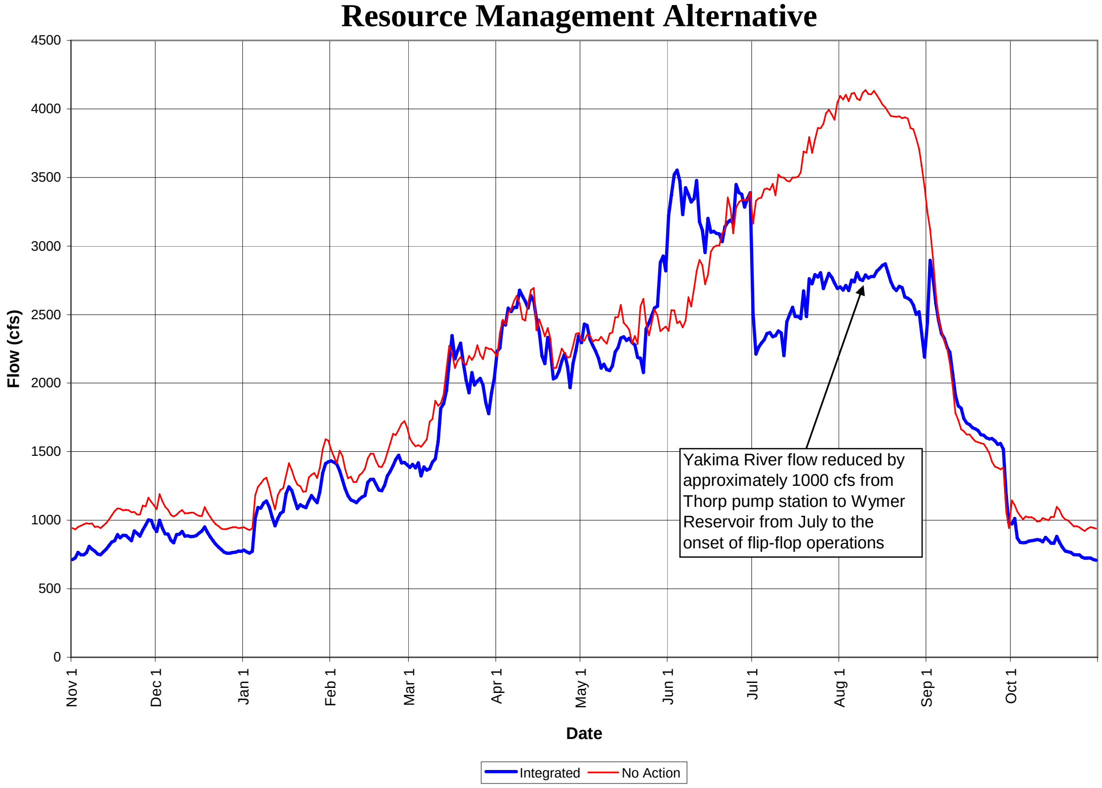


Figure 5-45 Yakima River at Umtanum Flow – Drought Year 1994 for Integrated Water Resource Management Alternative

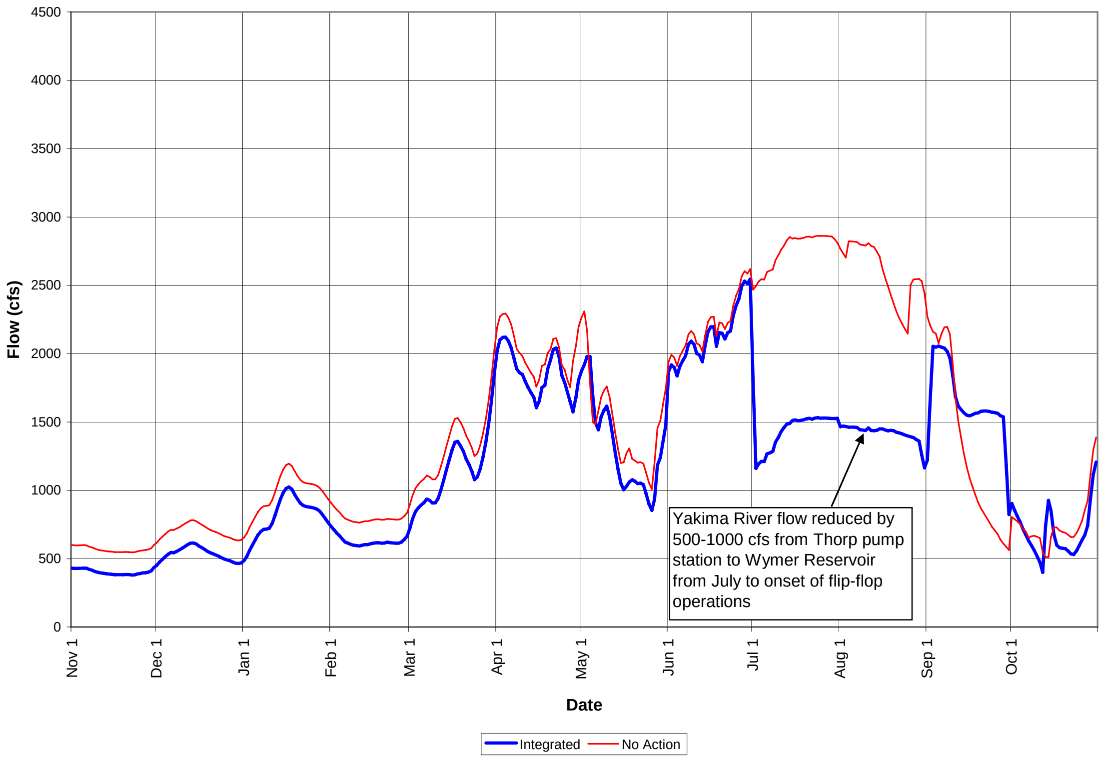


Figure 5-46 Yakima River at Umtanum Flow – Drought Year 2001 for Integrated Water Resource Management Alternative

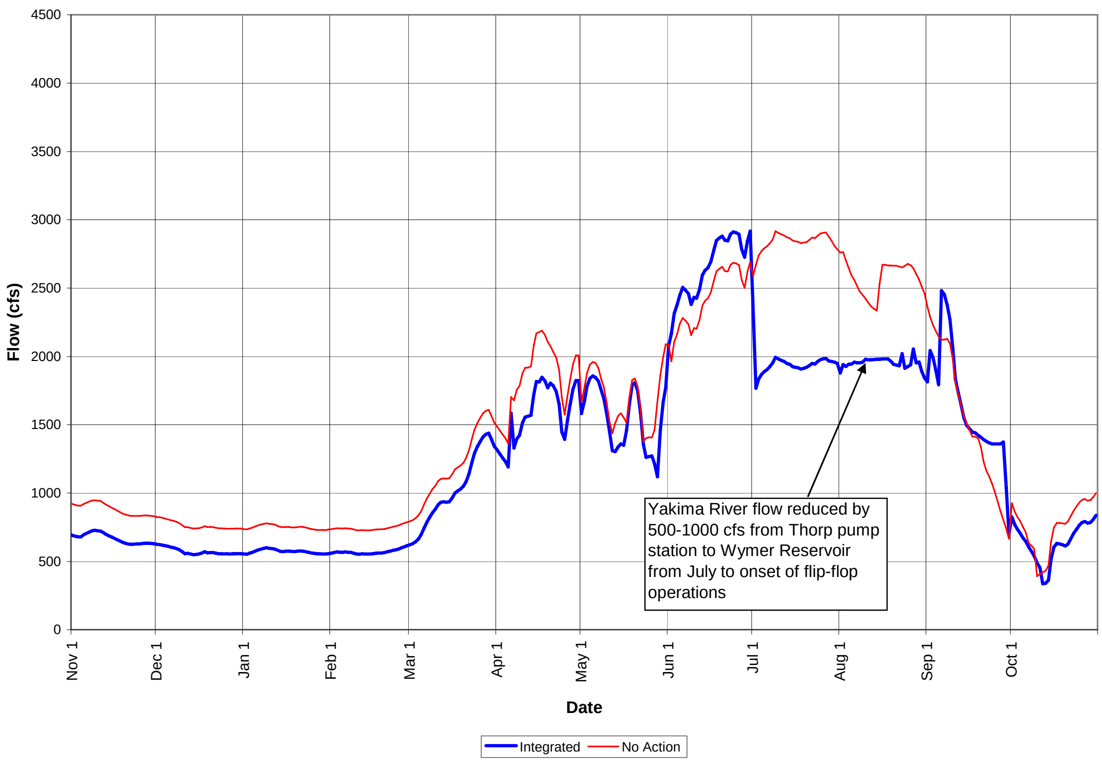
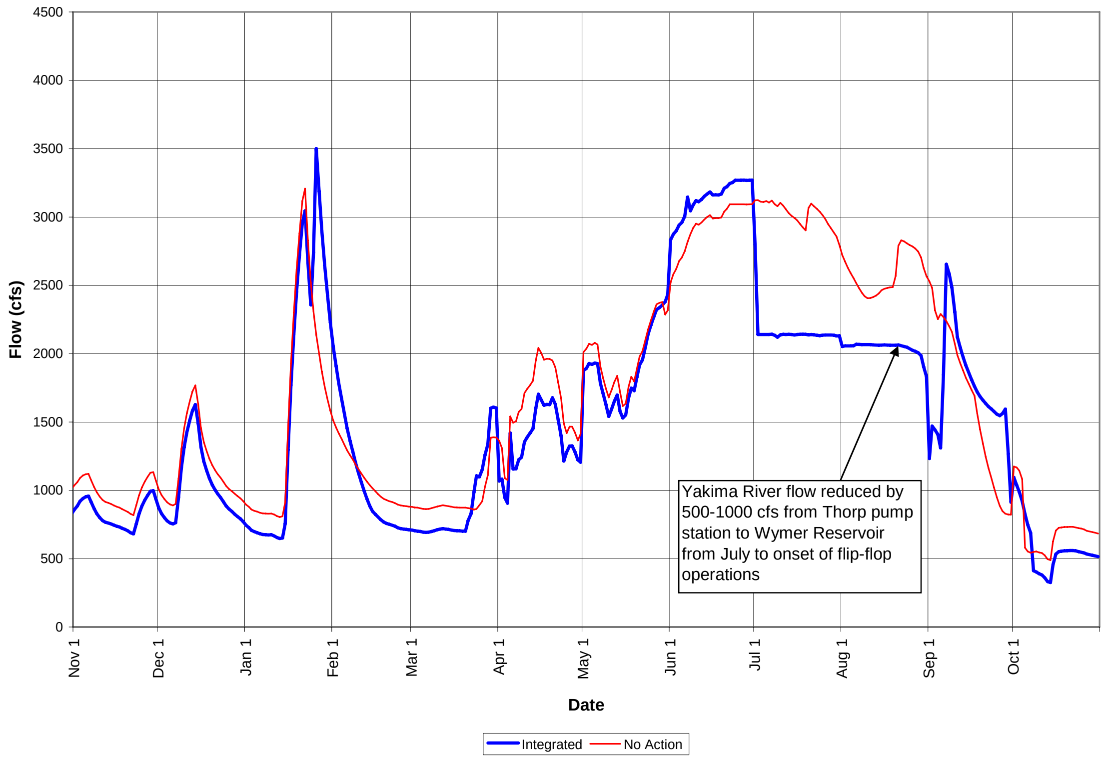


Figure 5-47 Yakima River at Umtanum Flow – Drought Year 2005 for Integrated Water Resource Management Alternative



As shown in Figure 5-41, flow in the Yakima River at Umtanum is slightly reduced during winter and spring months and greatly reduced during summer months by the Integrated Water Resource Management Alternative compared to the No Action Alternative. The summer reduction of approximately 1,000 cfs is a large improvement and helps address the issue of high flows in this reach of the Yakima River.

A similar pattern of effects also occurs during drought years.

Yakima River Flow at Parker Gage

Flow in the Yakima River at Parker is currently much lower than unregulated flows in spring and summer due to storage and diversions for irrigation water supply. Figure 5-45 shows a comparison of median flow for the Yakima River at Parker between the No Action Alternative and the Integrated Water Resource Management Alternative. Figures 5-46 through 5-48 show a comparison of flow for the Yakima River at Parker for drought years 1994, 2001, and 2005, respectively.

Figure 5-48 Yakima River at Parker Median Flow for the Integrated Water Resource Management Alternative

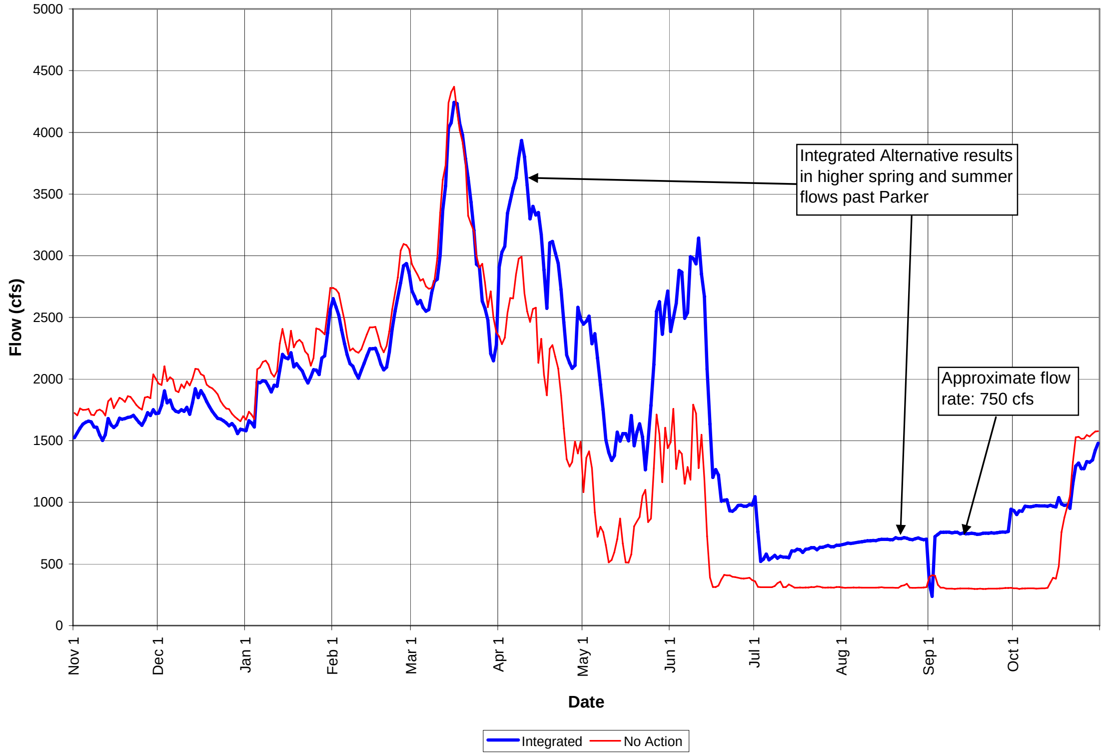


Figure 5-49 Yakima River at Parker Flow – Drought Year 1994 for the Integrated Water Resource Management Alternative

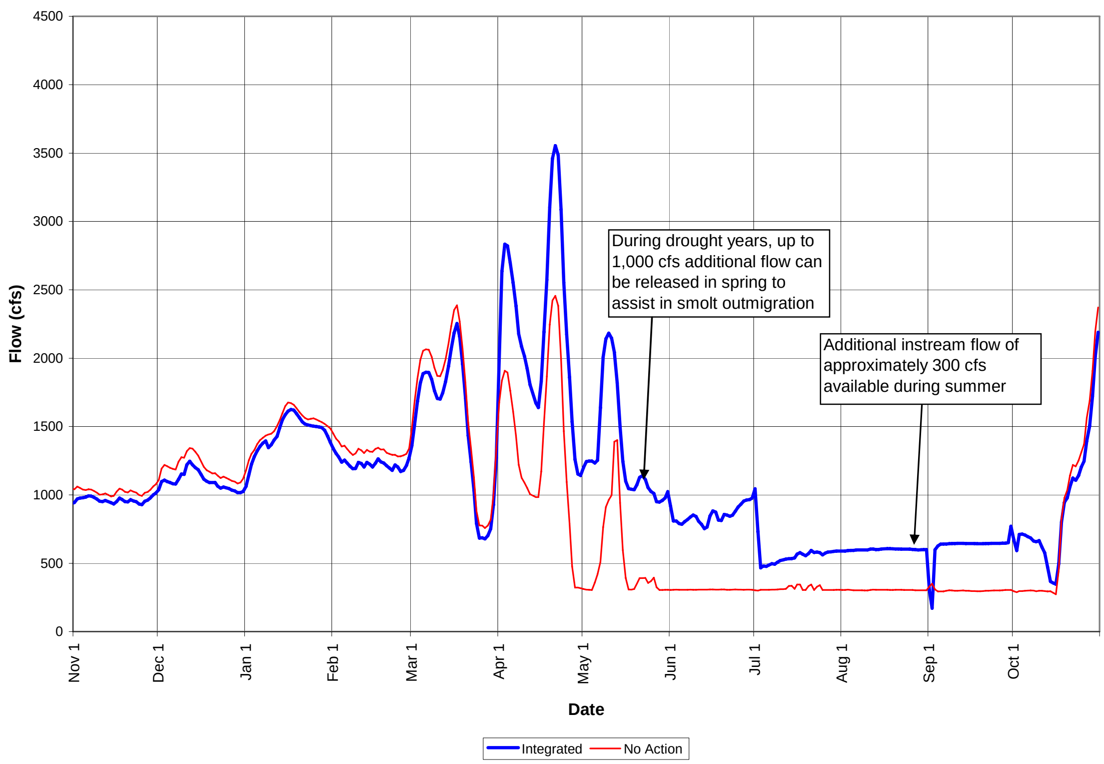


Figure 5-50 Yakima River at Parker Flow – Drought Year 2001 for the Integrated Water Resource Management Alternative

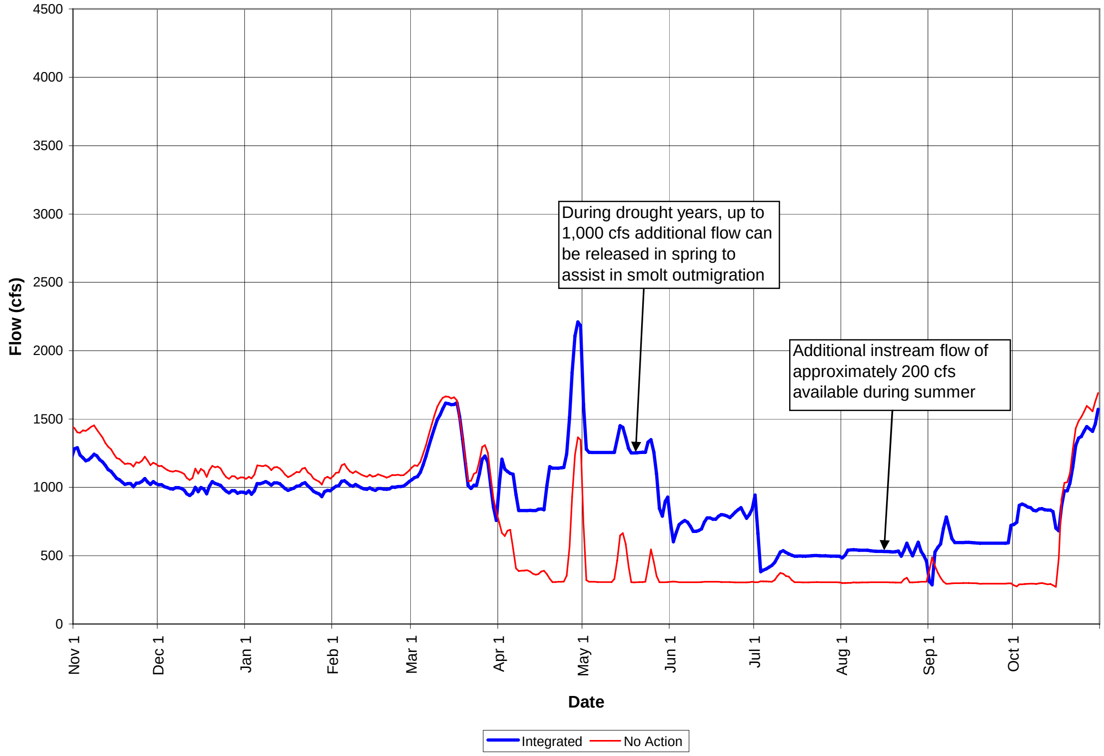


Figure 5-51 Yakima River at Parker Flow – Drought Year 2005 for the Integrated Water Resource Management Alternative

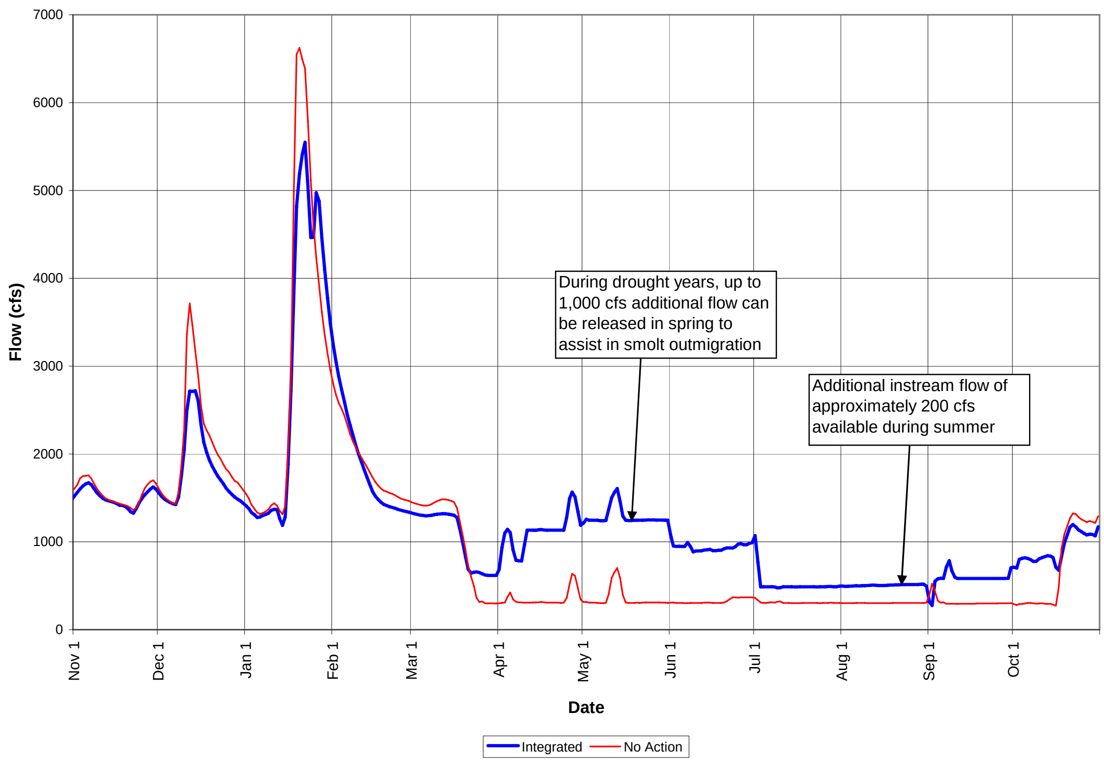


Figure 5-45 shows that flow in the Yakima River at Parker is significantly affected by the Integrated Water Resource Management Alternative compared to the No Action Alternative. Winter flows are slightly lower, but spring and summer flows are significantly higher for the Integrated Water Resource Management Alternative compared to the No Action Alternative. Spring flows are up to 1,000 cfs greater and summer flows are up to 450 cfs greater.

Drought years show similar changes for the Integrated Water Resource Management Alternative compared to the No Action Alternative. In drought years under current conditions, water supply conditions reduce the opportunity to provide spring outmigration flows. With the Integrated Water Resource Management Alternative, spring outmigration flows can be substantially increased. An increase of 1,000 cfs was modeled for this EIS. Summer flows are increased by 200-300 cfs.

Bumping River Flow

As stated in Section 3.3.3.1, flow in Bumping River is controlled by Bumping Lake operations. Currently, flow is regulated but similar to unregulated flow in the winter, lower than unregulated flow in the spring, and higher than unregulated flow in the summer. Figure 5-49 shows a comparison of median flow in the Bumping River below Bumping Dam between the No Action Alternative and the Integrated Water Resource Management Alternative. Figures 5-50 through 5-52 show a comparison of flow in the Bumping River below Bumping Dam for drought years 1994, 2001, and 2005, respectively.

Figure 5-52 Bumping River below Bumping Dam Quartile Flow Data for the Integrated Water Resource Management Alternative

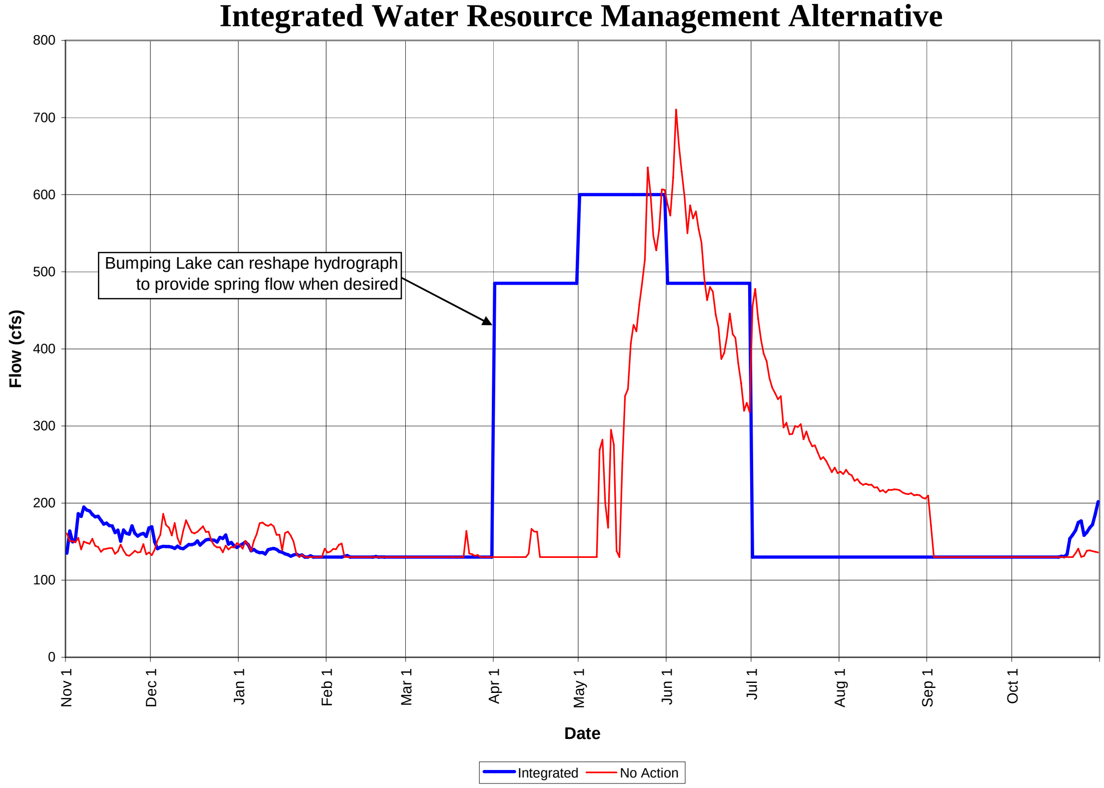


Figure 5-53 Bumping River below Bumping Dam Flow – Drought Year 1994 for the Integrated Water Resource Management Alternative

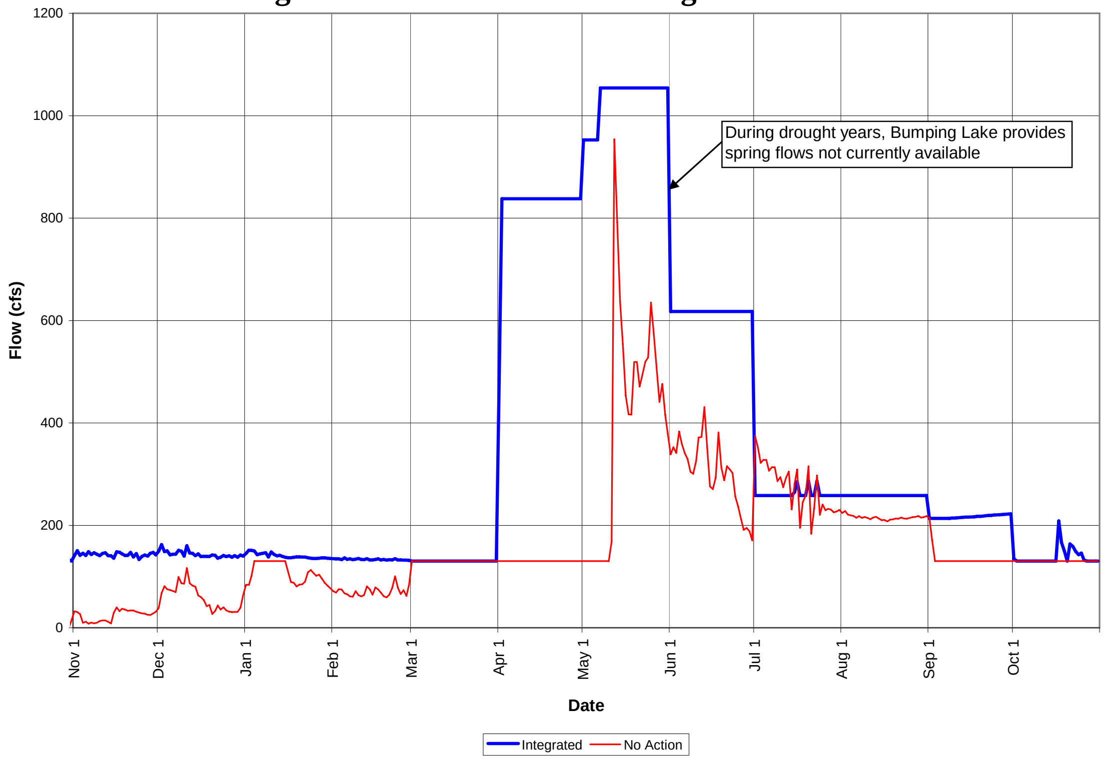


Figure 5-54 Bumping River below Bumping Dam Flow – Drought Year 2001 for the Integrated Water Resource Management Alternative

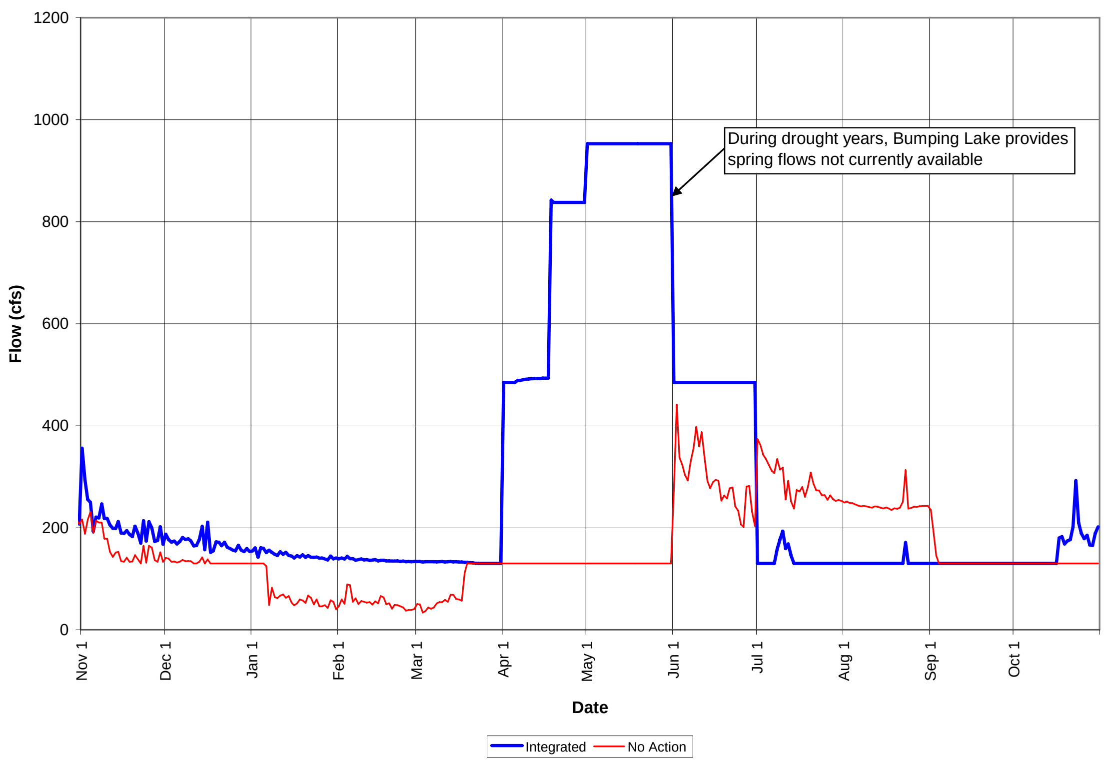
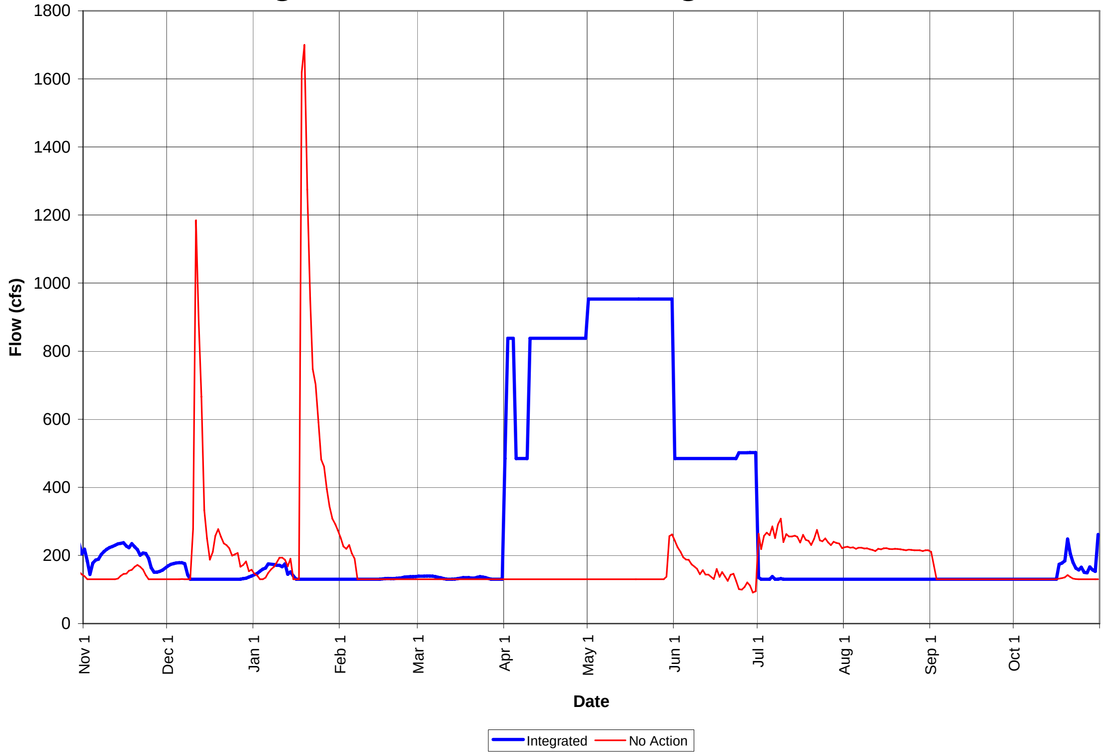


Figure 5-55 Bumping River below Bumping Dam Flow – Drought Year 2005 for the Integrated Water Resource Management Alternative



As shown in Figure 5-49, the Integrated Water Resource Management Alternative would increase Bumping River flow during spring months and decrease flow during summer months compared to the No Action Alternative. The expanded Bumping Lake would also allow the timing of releases to be modified to meet fish managers' recommendations. The modeling shows releases starting April 1 to provide spring outmigration flows. The No Action Alternative shows higher spring flow starting in May.

During drought years, the Bumping Lake Expansion – Large Option would substantially increase Bumping River flows in spring and summer. The spring flow increase is provided from storage to increase spring flows for smolt outmigration in the Bumping, Naches and Yakima Rivers. Currently, in drought years, spring flows are very low in those rivers. The increase in summer months is due to the release of storage water for irrigation purposes. Water is released from Bumping Reservoir to offset the additional water supplied to Roza Irrigation District from upper basin reservoirs.

Naches River Flow near Naches

The Naches River near Naches has mostly unregulated flow but is also influenced by Bumping Lake and Rimrock Lake operations. Currently, flow is lower than unregulated flow in the spring and much higher than unregulated flow during September and October due to irrigation releases and the flip-flop operation. Figure 5-53 shows a comparison of median flow at the Naches River near Naches gage between the No Action Alternative and the Integrated Water Resource Management Alternative. Figures 5-54 through 5-56 show a comparison of flow at the Naches River near Naches gage for drought years 1994, 2001, and 2005, respectively.

Figure 5-56 Naches River near Naches – Median Flow for the Integrated Water Resource Management Alternative

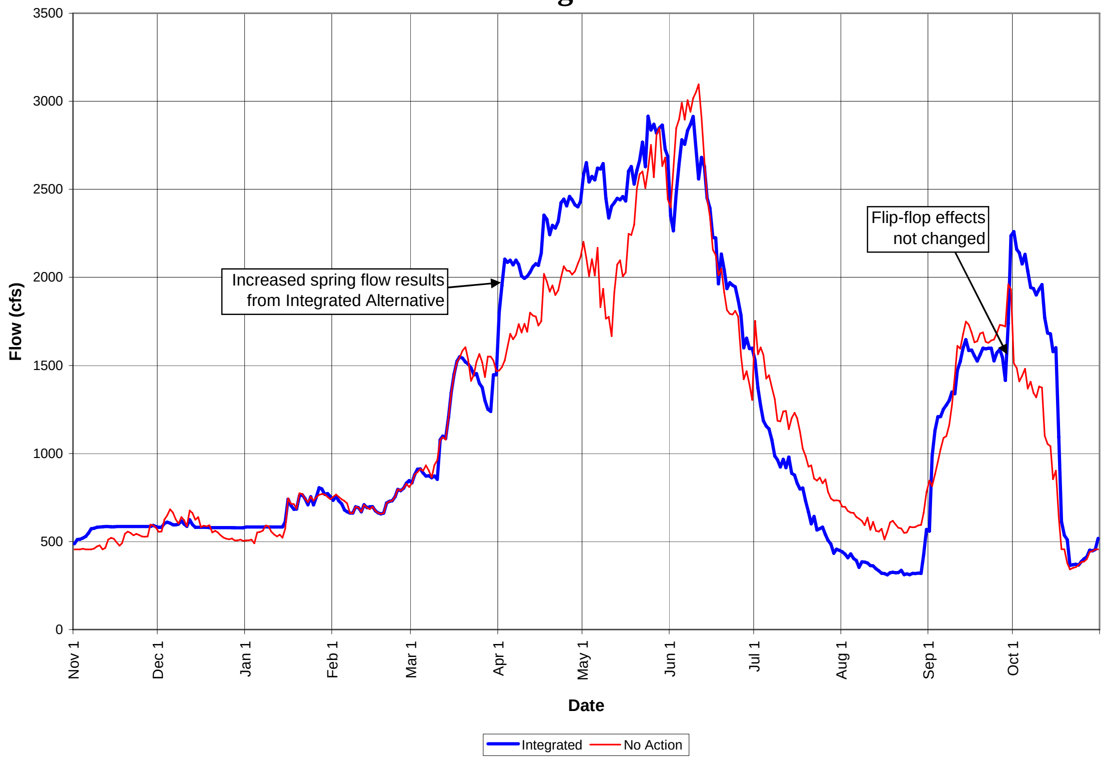


Figure 5-57 Naches River near Naches Flow – Drought Year 1994 for the Integrated Water Resource Management Alternative

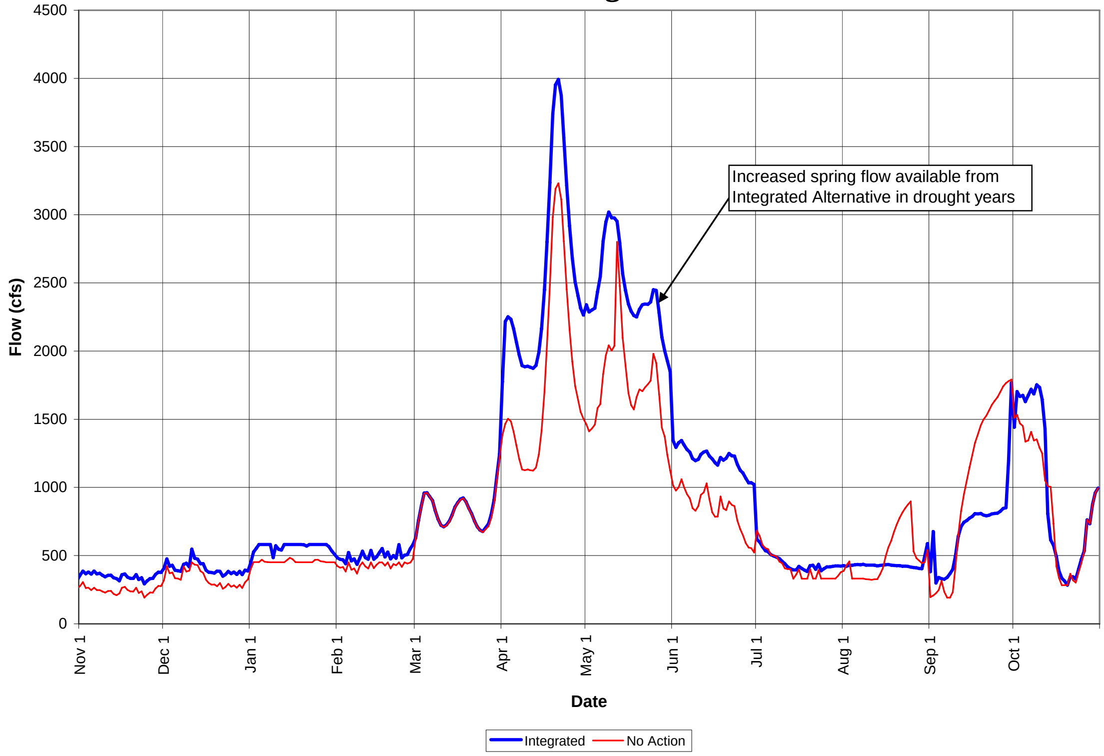


Figure 5-58 Naches River near Naches Flow – Drought Year 2001 for the Integrated Water Resource Management Alternative

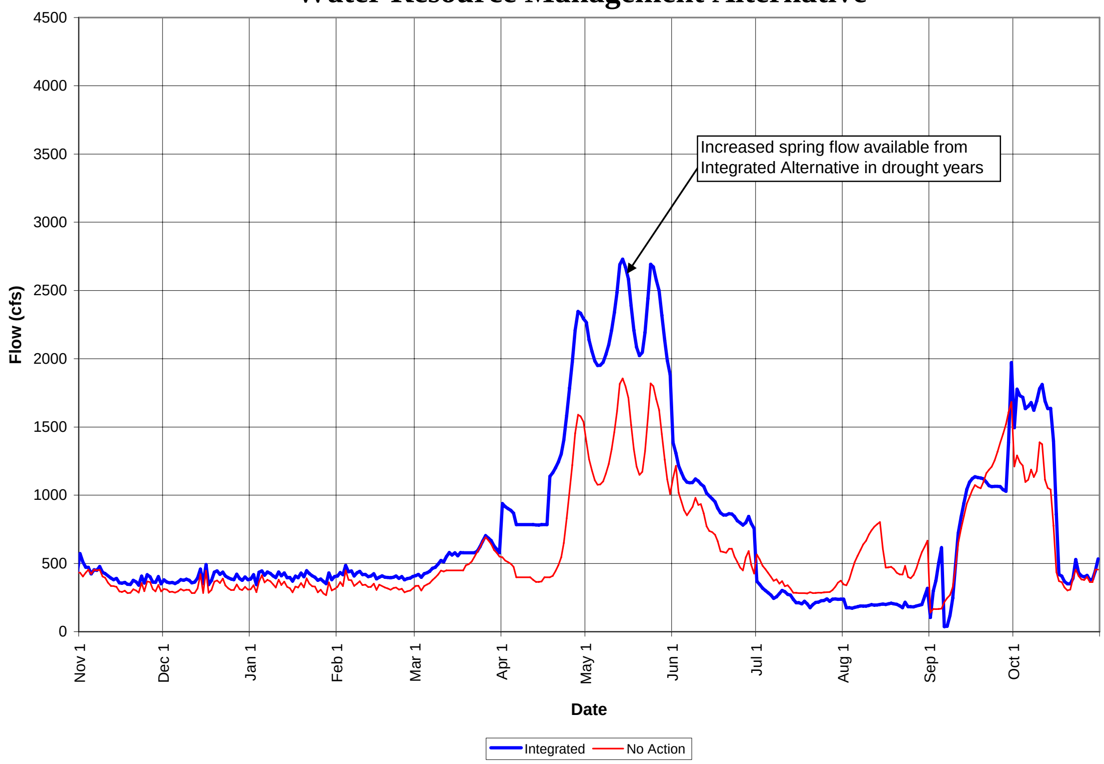
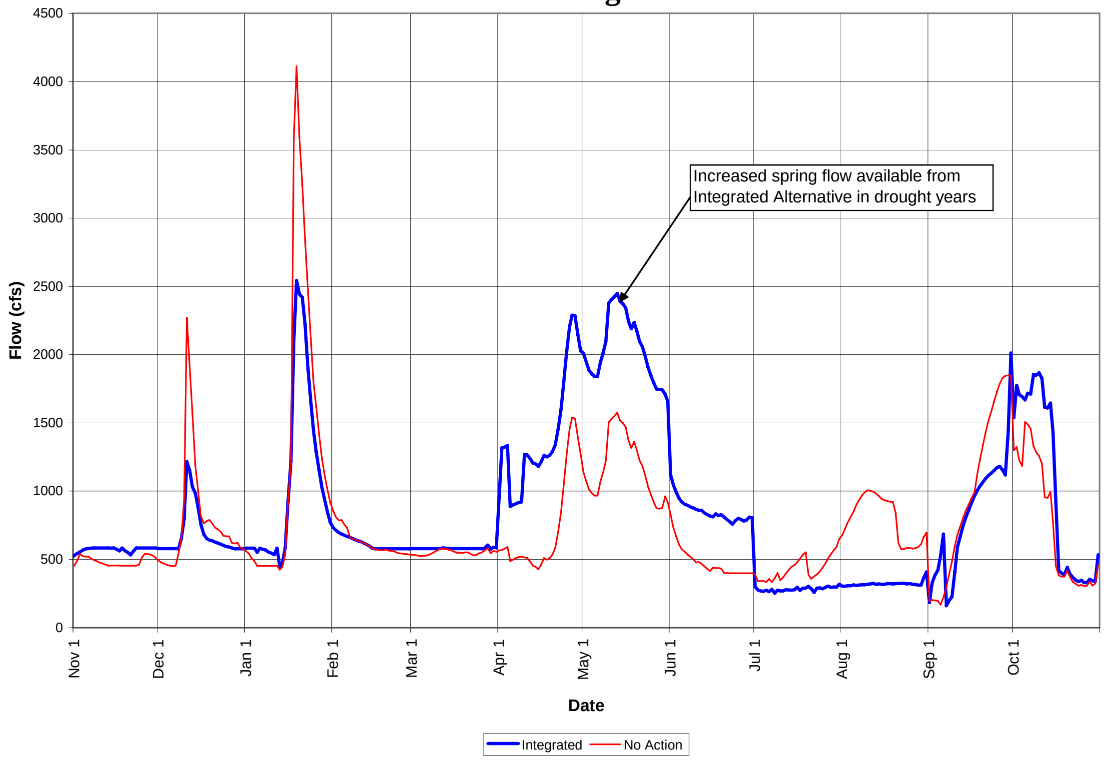


Figure 5-59 Naches River near Naches Flow – Drought Year 2005 for the Integrated Water Resource Management Alternative



The Integrated Water Resource Management Alternative would increase flow in spring and reduce flow in the summer in the Naches River near Naches compared to the No Action Alternative. Flip-flop is not changed from the Integrated Water Resource Management Alternative.

During drought years, the Integrated Water Resource Management Alternative would cause similar changes to the Naches River near Naches as in non-drought years compared to the No Action Alternative. As above, the changes bring the hydrograph closer to an unregulated state.

Hydrologic Indicators

Hydrologic indicators are used to show the effects an alternative has on the Yakima Project water supply over the 25-year hydrologic modeling period. Table 5-20 shows the changes in hydrologic indicators between the No Action Alternative and the Integrated Water Resource Management Alternative.

Table 5-20 Hydrologic Indicators of Integrated Water Resource Management Alternative Compared to No Action Alternative

Hydrologic Indicator	No Action Alternative				Integrated Water Resource Management Alternative			
	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005
April 1 TWSA (maf)	2.82	1.75	1.80	1.76	2.95	1.83	2.03	1.96
April-September flow volume at Parker gage (kaf)	506	188	131	119	705	374	289	299
April-September diversion volume upstream of Parker gage (maf)	2.02	1.48	1.59	1.56	1.92	1.54	1.75	1.70
September 30 non-Bumping or Wymer reservoir contents (kaf)	255	61	70	93	397	138	198	220
September 30 Bumping and Wymer reservoir contents (kaf)	11	6	6	7	456	190	351	328
April-September flow volume at mouth of Yakima River (kaf)	847	322	250	283	1,065	553	452	498
Irrigation proration level (percent)[1]	85%	28%	40%	38%	90%	38%	60%	54%

[1] – Irrigation proration level does not include irrigation water set specifically for Roza Irrigation District during drought years.

April 1 TWSA

The Integrated Water Resource Management Alternative increases the April 1 TWSA compared to the No Action Alternative. The April 1 TWSA is increased by 4.6 percent on average for the hydrologic period modeled (1981-2005). In 1994, the April 1 TWSA is also increased by 4.6 percent. In 2001 and 2005, the April 1 TWSA is increased by 12.8 percent and 11.4 percent, respectively.

April-September Yakima River Flow Volume at Parker

The Integrated Water Resource Management Alternative would significantly increase the flow volume at Parker from April to September compared to the No Action Alternative. On average, the flow volume at Parker gage increases by 39 percent for the Integrated Water Resource Management Alternative compared to the No Action Alternative. During drought years, the flow volume at Parker gage also increases. In 1994, the flow volume at Parker gage increases by 99 percent. In 2001 and 2005, the flow volumes at Parker gage increase by 121 percent and 151 percent, respectively.

April-September Diversion Volume Upstream of the Parker Gage

The diversion volume upstream of Parker from April to September is decreased in most years with the Integrated Water Resource Management Alternative, primarily because of the Enhanced Water Conservation Element. During drought years, the diversion volume for the Integrated Water Resource Management Alternative is increased by 4.1 percent in 1994, 10.1 percent in 2001, and 9 percent in 2005 compared to the No Action Alternative because of the increased water supply available.

September 30 Reservoir Contents

A significant increase in September 30 reservoir contents occurs (not including Bumping or Wymer Reservoirs) for the Integrated Water Resource Management Alternative compared to the No Action Alternative. During drought years, the reservoir contents (not including Bumping or Wymer Reservoirs) also show a significant increase for the Integrated Water Resource Management Alternative compared to the No Action Alternative on September 30.

Table 5-21 presents a comparison of reservoir storage on March 31, June 30, and September 30 for the Integrated Water Resource Management Alternative and the No Action Alternative.

Table 5-21 Yakima Project Reservoir Contents (kaf)

Date – Reservoir	No Action Alternative				Integrated Water Resource Management Alternative			
	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005
March 31 – Bumping & Wymer	11	4	2	10	538	437	564	568
March 31 – All others	592	202	343	620	666	215	489	750
June 30 – Bumping & Wymer	33	33	33	33	548	357	486	465
June 30 – All others	875	530	544	603	917	533	657	700
Sept 30 – Bumping & Wymer	11	6	6	7	456	190	351	328
Sept 30 – All others	255	61	70	93	397	138	198	220

April-September Yakima River Flow Volume at Mouth

A significant increase in the Yakima River flow volume at the mouth occurs for the Integrated Water Resource Management Alternative compared to the No Action Alternative on average and during the drought years of 1994, 2001, and 2005. The Yakima River flow volume at the mouth is increased by 26 percent on average for the Integrated Water Resource Management Alternative compared to the No Action Alternative. The Yakima River flow volume at the mouth is increased by 72 percent, 81 percent, and 76 percent for drought years 1994, 2001, and 2005, respectively, for the Integrated Water Resource Management Alternative compared to the No Action Alternative.

Irrigation Proration Level

An increase in proration level occurs for the Integrated Water Resource Management Alternative compared to the No Action Alternative. In drought years 1994, 2001, and 2005, the proration level is increased by 10 percent, 20 percent, and 16 percent, respectively. These proration levels do not include the storage releases from Bumping Lake set specifically for Roza Irrigation District in the model. In single drought years such as 2001 and 2005 the proration level is 54-60 percent. When combined with a more efficient delivery system resulting from the Enhanced Water Conservation Element, much more water is being delivered to farms with the Integrated Water Resource Management Alternative than the No Action Alternative.

Seasonal Flow Volume Objectives

Table 5-22 presents the seasonal flow volume objectives for the Yakima River at Umtanum and Parker gages. Seasonal flow volume objectives are developed from unregulated flow regimes for the Yakima, Naches, Cle Elum, Bumping, and Tieton Rivers. Table 5-22 also presents the average seasonal flow volumes for the Yakima River at Umtanum and Parker gages for the Integrated Water Resource Management Alternative as well as the No Action Alternative.

Table 5-22 Seasonal Flow Volumes

Alternative	Umtanum Flows (maf)			Parker Flows (maf)		
	Spring	Summer	Winter	Spring	Summer	Winter
Objective	0.636	0.298	0.280	0.717	0.309	0.490
No Action	0.676	0.620	0.380	0.659	0.138	0.696
Integrated	0.700	0.564	0.356	0.796	0.210	0.666

Notes: Spring – March-June; the desired outcome is to meet or exceed the flow objective volume
Summer – July-October; the desired outcome is to not exceed, but not fall too far below the flow objective volume
Winter – November-February; the desired outcome is to meet or exceed the flow objective volume

As shown in Table 5-22, for the Umtanum gage, the average seasonal flow volumes for the Integrated Water Resource Management Alternative were estimated to be:

Spring: 10 percent above the flow objective

Summer: 89 percent above the flow objective

Winter: 27 percent above the flow objective

As shown in Table 5-22, for the Parker gage, the average seasonal flow volumes for the Integrated Water Resource Management Alternative were estimated to be:

Spring: 11 percent above the flow objective

Summer: 32 percent below the flow objective

Winter: 36 percent above the flow objective

Table 5-23 compares the average seasonal flow volume differences relative to the flow objective volumes for the Integrated Water Resource Management Alternative and the No Action Alternative.

Table 5-23 Alternative Seasonal Flow Volumes Compared to Objective Flow Volumes

Alternative	Umtanum Flows (maf)			Parker Flows (maf)		
	Spring	Summer	Winter	Spring	Summer	Winter
No Action	6%	108%	36%	-8%	-55%	42%
Integrated	10%	89%	27%	11%	-32%	36%

Notes: Spring – March-June; the desired outcome is to meet or exceed the flow objective volume
Summer – July-October; the desired outcome is to not exceed, but not fall too far below the flow objective volume
Winter – November-February; the desired outcome is to meet or exceed the flow objective volume

As shown in Table 5-23 the Integrated Water Resource Management Alternative shows a significant positive change towards achieving flow objectives compared to the No Action Alternative. For spring at both Umtanum and Parker gages, flows are increased compared to the No Action Alternative, which is a positive change. For summer at the Umtanum gage, flows are decreased for the Integrated Water Resource Management Alternative compared to the No Action Alternative. This is a positive change compared to flow objectives flows as flows are currently too high during the summer in the reach of the Yakima River represented by the Umtanum gage. At the Parker gage, summer flows are increased for the Integrated Water Resource Management Alternative compared to the No Action Alternative. This is also a positive change compared to flow objectives as flows are currently too low during the summer in the Yakima River below the Parker gage. For winter at both the Umtanum and Parker gages, flows are decreased for the Integrated Water Resource Management Alternative compared to the No Action Alternative. This reduction, while bringing flows a bit closer to winter flow objectives, is not a significant change.

Municipal & Industrial Demand

Future increases in M&I demands were not applied to the hydrologic model. However, the results of the modeling indicate that irrigation proration levels increase by 10-20 percent during drought years and 320-550 kaf of storage remains in reservoirs on September 30. These results indicate the small (relative to irrigation demands) M&I demands could likely be met in most years with surface water supplies provided with the Integrated Water Resource Management Alternative. Other elements of the Integrated Water Resource Management Alternative could also provide future M&I demands such as Ground Water Storage and Market –Based Reallocation of Water Resources. With the Integrated Water Resource Management Alternative, providing additional water that is diverted and managed using ground water storage would be much easier.

5.3.3.1 Qualitative Summary of Impacts to Flows

The qualitative analysis shown in Table 5-24 illustrates the potential benefit or impact to the flow regime for the upper, middle, and lower Yakima River. The benefit to the flow regime may be increased or decreased flow in a reach or tributary during a particular season. The magnitude of that increase or decrease relative to a flow regime that more closely resembles the natural hydrograph was qualitatively assessed and described as having no benefit or impact, or having a low, medium, or high benefit or impact. The effects of the Integrated Water Resource Management Alternative are shown to have medium to high benefits in spring and summer for many of the reaches in the Yakima River basin.

Table 5-24 Summary of Impacts to Flow by Integrated Water Resource Management Alternative – Upper, Middle, and Lower Yakima River

Season	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Winter (Oct-March)	○	▪	○	▪	▪	○	○	○	◒	○	○	○	○	○	○	○
Spring (April-June)	○	▪	○	▪	▪	◒	◒	○	○	○	○	○	◒	◒	○	○
Summer (July-Sept)	○	▪	○	▪	▪	●	●	○	●	●	○	○	●	●	○	○

Season	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Winter (Oct-March)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spring (April-June)	●	○	◒	○	○	○	○	○	●	◒	○	○	◒	◒	◒	○	○	●	◒
Summer (July-Sept)	◒	○	○	○	○	◒	●	○	◒	◒	○	◒	◒	◒	◒	○	○	◒	◒

Symbol	
●	High Benefit
◒	Medium Benefit
▪	Low Benefit
○	No Change or Benefit

5.3.4 Mitigation Measures

Mitigation measures for potential impacts to surface water were described in Section 5.2.4 of the January 2008 Draft Planning Report/EIS. No additional mitigation measures are proposed because the impacts are not expected to be significant and would be offset by the benefits of the elements within the alternative.

5.4 Water Rights

5.4.1 No Action Alternative

Several projects included in the No Action Alternative have the potential to cause long-term impacts to water rights. Impacts to water rights under the No Action Alternative would be evaluated separately as those projects are undertaken.

Water rights acquired on a temporary basis for a period of longer than one year and those acquired on a permanent basis would be considered to have long-term impacts. The water rights would be transferred to the state Trust Water Rights Program and would improve stream flows for fish. Because state water law protects water rights from injury, no negative impacts to water rights are anticipated.

The Yakama Nation holds a water right for instream flow for fish with a priority date of time immemorial. The water right is not quantified. The court in the Yakima Adjudication confirmed a right to the "minimum instream flow necessary to support aquatic life." Alternatives that would result in an increase in stream flow would not change the water right confirmed by the court; however, for purposes of this analysis an increase in streamflow will be considered to have a positive impact on the Yakama Nation's water right for fish.

Similar long-term impacts would be anticipated from water acquired for instream flow through grants from the SRFB and through the work of private conservation groups such as the Washington Rivers Conservancy and the Washington Water Trust.

5.4.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.4.2.1 Fish Passage Element

No long-term impacts to water rights are expected from the fish passage element.

5.4.2.2 Modifying Existing Structures and Facilities Element

Operational Changes at Existing Facilities

Operational changes at the power generation facilities at Roza Dam and Chandler Power Plant have the potential to cause long-term impacts to Reclamation's ability to fully exercise its water rights for power production. The water rights for power production authorize the diversion of a maximum instantaneous quantity of water. The court did not confirm an annual quantity for the rights because the power plants are operated as run-of-the-river plants. The water rights authorize year-round diversions with the conditions described in Section 3.4.2.1.1 and Section 3.4.2.1.2. At Roza, the proposal is to reduce or eliminate diversions for power production during smolt out-migration from April 1 to May 31. At Chandler Power Plant the proposal is to increase the threshold stream flow at which Reclamation reduces diversions from the Yakima River for power production. To the extent either of these proposals is implemented on a long-term or permanent basis, Reclamation's ability to fully exercise its water rights for power production would be reduced. The actions would increase stream flow in the Yakima River bypass reaches, 15 miles at Roza Dam and 12 miles at Chandler Power Plant.

Structural Changes to Existing Facilities

The WIP is operated by the Bureau of Indian Affairs in consultation with the Yakama Nation. The WIP, working with Reclamation, is proposing to change the point of diversion for the Satus diversion at Wapato Dam downstream to a new pump station near Granger. This would require a change in point of diversion for the WIP water right, which would be subject to approval by Ecology and only approved if there would be no unmitigated impacts to other water rights. The KID Pump Exchange Project is currently being reviewed by Ecology and a change in point of diversion for the KID water right would also be required.

KRD Canal Modifications to Improve Tributary Flows

Four tributaries in the KRD have been identified as having instream flow problems: Taneum, Manastash, Big and Little Creeks. One proposal is to modify the KRD Main Canal and South Branch Canal to provide water to water users who divert from the tributaries. In addition it has been suggested that acquiring water from those water users now diverting from the tributaries could improve flows in the tributaries.

Proposals to pipe laterals along the Main Canal and South Branch Canal of KRD and to install a pump station at the tail end of the South Branch Canal would be expected to free capacity in the canals. This would allow KRD to discharge water directly to the creeks or to water users who currently divert from the creek.

For KRD to directly supply water to water users who are now diverting from the creeks would require Ecology's approval to change the point of diversion and source of water under the water rights. The water users, who have confirmed rights to divert from the creeks, would be required to change their point of diversion to KRD's main diversion from the Yakima River. The source would also change from the creek to the Yakima River. KRD and the water right holders would enter into an agreement for KRD to divert and convey water through its system to the individual users. KRD would be authorized to divert additional water from the river to supply the water right holders who change their point of diversion. In the alternative, KRD may allow the individuals to become members of KRD, and KRD would acquire the right to divert and convey the water under KRD's water right.

The potential impacts to the tributaries and the individual water users are positive. There is a potential for impairment of any water rights that have a point of diversion between

KRD's diversion from the Yakima River and the confluence of the tributary with the river. The flow in the river in this reach would be reduced by the additional quantity diverted by KRD.

Complete the Wapatox Project

The proposals include consolidating the Wapatox and Naches-Selah diversions and/or using the Wapatox diversion to supply water to the Yakima treatment plant and the Gleed Ditch (see Figure 2-3). Both of these proposals would require changes in the point of diversion of water rights confirmed in the Yakima Adjudication. Both proposals would improve stream flow in the Naches River. Modifying the conveyance system would also have a positive impact on the irrigators' water rights by allowing them access to the full amount of water under their water rights.

5.4.2.3 New Storage Element

Reclamation's water rights, including those for storage, were confirmed by the Adjudication Court on March 12, 2007. The court quantified Reclamation's storage rights in terms of "total active capacity" with no cap for the annual amount of water that may be stored as Reclamation drafts down the reservoirs and then refills them during the season. Any expansion of existing storage capacity beyond that confirmed by the court and any construction of new storage reservoirs would require a new water right from the state. Reclamation would apply for new water rights under its Withdrawal from Appropriation, which was filed on February 17, 1981, and extended again this year until January 18, 2013. The public notice regarding the request for an extension stated that Reclamation intends to use unappropriated waters to satisfy purposes under YRBWEP and for water storage projects currently authorized or those authorized in the future (Ecology, 2007b).

Construction and operation of new storage facilities would require obtaining a reservoir permit from Ecology (RCW 90.03.370). Applications for reservoir permits are subject to the permitting requirements in RCW 90.03.250 through 90.03.320. Ecology would apply the same four-part test to Reclamation's request for a new water right as it does in deciding whether to issue any new water right. Ecology may only issue a new water right if there is water available, if it would be used for a beneficial use, and if it would not impair existing rights or be detrimental to the public welfare (RCW 90.03.290).

Generally, parties that propose to put stored water to a beneficial use must also file an application for a secondary permit. However, a secondary permit is not required where a water right permit or certificate for the source of the stored water authorizes the beneficial use (RCW 90.03.370(1)(c)). Thus, a secondary permit would not be required for proratable irrigation districts that have water rights to the Yakima River. If water users wish to have additional quantities of water over and above their adjudicated amounts, they would be required to file for a secondary permit.

Expansion and construction of new storage is intended for the multiple purposes of providing a better supply of water for irrigation during drought years, water for future municipal growth, and improved stream flow. The court confirmed Reclamation's storage rights with the following condition: "Filling, detention, carryover, release and delivery of water to … Reclamation and entities authorized to receive water from Reclamation." For existing rights in the adjudication, the specific purpose of use for the water is to be described on the diversionary water right certificates of those who receive water from Reclamation. The irrigators who would receive more water during drought years have existing diversionary rights for irrigation. Water for municipal growth may be under existing permits or new municipal water rights. Water released for instream flow would be transferred to the state Trust Water Rights Program and the certificate held by the state (RCW 90.38.040).

Bumping Lake Expansion

The existing water right for Reclamation to store water in Bumping Lake is for a total active capacity of 38,768 acre-feet. The large expansion option would be to store 458,000 acre-feet. The small option would allow storage of 200,000 acre-feet. Operation of the new storage capacity would supply additional water to proratable irrigators in dry years only and to provide additional water for fish to allow flexibility in the system. Examples of how the new storage could be used are listed in Section 2.3.4.1.

The impacts to proratable water rights would be positive. The storage could be used to shape flows in the Yakima and Tieton Rivers to provide better fish habitat. It could also be used to provide pulse flows to assist out-migrating smolts.

Wymer Dam

Storage in a new Wymer reservoir would require Reclamation to obtain a new water right. Until a route for conveying water to a new reservoir is established, specific potential impacts on water rights cannot be determined. However, as explained in Section 5.4.2.3, Ecology may not issue a new water right to Reclamation if it would adversely impact existing water rights or be detrimental to the public welfare. If construction of Wymer reservoir resulted in Reclamation's ability to modify river operations, it could improve instream flow for fish.

Ahtanum Creek Watershed Restoration Program, Including Pine Hollow Reservoir

The impacts to water rights from this option, including Pine Hollow reservoir, were discussed in Ecology's Final Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005) (Section 6.13.2). As discussed in the EIS, a new water right would be required to authorize diversion into the reservoir and storage of water. The minimum quantity of water required would be the total amount needed to supply water to the WIP, Johncox Ditch, and Ahtanum Irrigation District water users. The reservoir would allow all water users within the reservoir service area to stop diverting from streams or withdrawing ground water from wells. These changes would require Ecology's approval for a change in point of diversion.

The Adjudication Court has issued rulings since Ecology issued the Final Programmatic EIS for the Ahtanum Creek Watershed Restoration Program that will affect the potential impacts of this alternative. Significantly, the court ruled that the Northside water users do not have a right to divert after July 10 under their existing rights (Supplemental Report of the Court Concerning the Water Rights for Subbasin No. 23 (Ahtanum Creek), Ahtanum Irrigation District, Johncox Ditch Company and United States/Yakama Nation, February 25, 2008). Under this ruling, they would need to apply for a new water right to receive delivery of water from the reservoir after July 10 each year. The court also held that there is no requirement to maintain 0.25 cfs in the stream for non-diversionary stockwater in Bachelor and Hatton Creeks. This means that there is no requirement to divert water from Ahtanum Creek into these creeks after July 10. The court heard exceptions to these and other rulings at a hearing in late October 2008. The court's final decision is anticipated in early 2009.

5.4.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on water rights were described in Section 5.2.5.3 of the January 2008 Draft Planning Report/EIS.

5.4.2.5 Fish Habitat Enhancement Element

If fish enhancement projects include acquisition of water for instream flow, the discussion in Section 5.4.1 applies. For the reach of the Yakima River from Roza Dam to Prosser Dam, irrigation would occur in winter to saturate floodplains. This would either require acquisition of a new water right or a change in the season of use of an existing irrigation right. As with any new water right or change to a water right, Ecology may not approve the water right or change if it would impair existing water rights.

5.4.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on water rights were described in Section 5.2.5.1 of the January 2008 Draft Planning Report/EIS.

5.4.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on water rights were described in Section 5.2.5.2 of the January 2008 Draft Planning Report/EIS.

5.4.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

With respect to water rights, it is anticipated that the Integrated Water Resource Management Alternative would have additive positive impacts to instream flow for fish. New storage to provide additional water for proratables during drought years would also be additive. Because no new water rights may be issued or changes to water rights may be approved that would impair existing rights, the Integrated Water Resource Management Alternative should not have negative impacts on water rights.

5.4.4 Mitigation Measures

If impacts of new water rights or changes to water rights are identified, the water right may be issued or the change approved if the impact can be mitigated. For example, one alternative is for KRD to divert water at its diversion point on the Yakima River and deliver it to water users on tributaries within the District's service area in lieu of diversions directly from the tributaries. In this case, there would be a corresponding reduction in flow in the Yakima River from KRD's point of diversion downstream to the confluence of the tributaries and an impact on the Yakama Nation's water right to instream flow for fish. However, the Yakama Nation may agree that this impact is mitigated by the increased flow in the tributaries. Whether mitigation is required would be specific to each situation and would be determined during the water rights review process. Additional mitigation measures for potential impacts of water rights or changes to water rights were described in Section 5.2.6 of the January 2008 Draft Planning Report/EIS.

5.5 Ground Water

5.5.1 No Action Alternative

Under the No Action Alternative, the existing activities, programs, and trends in the Yakima River basin would continue. Deficiencies in irrigation water availability may increase demand on ground water. An increase of land conversion to residential use may result in an increase in new exempt wells, resulting in overuse of ground water. Continued issuance of permits for emergency use of ground water wells in drought years could also result in overuse of ground water. Existing ground water levels and issues would likely persist.

5.5.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Long-term impacts to ground water may occur during the operation of constructed facilities. Increased recharge to ground water may increase aquifer pressure and result in increased base flows. Decreasing the ground water irrigation demand may increase downstream ground water levels. The ground water impacts for specific projects would be described in detail in future site-specific investigations.

5.5.2.1 Fish Passage Element

No long-term impacts on ground water are expected from the operation of constructed fish passage facilities.

5.5.2.2 Modifying Existing Structures and Facilities Element

Releasing additional volumes for stream flow augmentation during dry seasons would have a limited long-term impact on regional ground water conditions. Shallow and ground water in close connection to stream flows could be improved by stream flow augmentation. Improvements in irrigation conveyance facilities would decrease localized ground water recharge and shallow ground water interception that currently occurs from canal seepage.

5.5.2.3 New Storage Element

Operating new storage would permanently increase ground water levels near new reservoirs. Increased infiltration beneath the reservoir would also occur. The magnitude of impact to water levels would depend on the size and depth, the hydraulic head created, and local hydrogeologic characteristics. Additionally, use of borrow material for construction could locally increase seepage or infiltration rates. Increases in ground water elevation could occur in the immediate vicinity of the reservoir and larger-scale changes in ground water flow patterns are possible. A decreased demand on downstream ground water for irrigation may also increase ground water levels downstream of the storage facility.

5.5.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on ground water were described in Section 5.3.2.3 of the January 2008 Draft Planning Report/EIS. Additional analyses that were completed for ground water storage options are included below.

Evaluation of the Potential for Municipal Direct Injection

To evaluate the potential for utilizing ASR, a three-dimensional ground water flow model was developed of the Ahtanum-Moxee Subbasin in the Yakima Valley. The goal of modeling was to estimate the quantity of recharged water to three injection wells that would: (a) return to the Yakima River; (b) discharge at other hydrologic sinks; or (c) remain in the subsurface in the form of increased ground water storage. The impacts of direct injection for both passive and active recovery are based on the computer simulation of the direct injection of water into the deeper portion of the ground water system of the Ahtanum Valley. The results are summarized below. Details of the modeling and results are described in the Technical Report prepared for the Groundwater Alternative (Ecology, 2009a).

- <u>Direct Injection</u>. Direct injection resulted in an immediate increase of aquifer storage and a delayed seepage of water to the stream. After the first annual cycle, 92 percent of the recharged water remained in the aquifer, and the increased seepage rate from the aquifer to the Yakima River above baseline conditions was approximately 0.6 cfs. Direct injection during winter months for 10 years resulted in an increased aquifer storage by approximately 28,600 acre-feet, and a seepage rate of approximately 3 cfs at the end of the 10-year period.

- <u>Active Recovery</u>. Active recovery of recharged water on an annual basis resulted in a recovery efficiency of greater than 92 percent. For instance, an injection rate of 8,000 gpm (17.9 cfs) over half a year results in a recoverable volume of approximately 6,000 acre-feet per year, with the remainder of the recharged water that is not recovered seeping out to streamflow.

- Passive Recovery. Passive recovery results in a year-round seepage rate approximately equal to the average annual recharge rate once equilibrium is achieved. For instance, extrapolating the model results to an injection rate of 8,000 gpm (17.9 cfs) over half a year results in increased streamflows of approximately 8.9 cfs.

Evaluation of the Potential for Regional ASR

Several large-scale wellfields using wells with high injection and recovery rates (on the order of 2,500 gpm per well) would be used for both injection and recovery. The water stored during the early spring would be pumped out during the summer as a direct offset to TWSA and the water would be pumped into the existing and/or modified canal system. The wellfields could be operated year-after-year to increase the total water supply or only during dry or drought conditions to satisfy junior water rights.

The analysis evaluated the aquifer response to injection and storage from a wellfield injecting approximately 65,000 acre-feet (2,500 gpm per well; 274 cfs per wellfield) over a 120 day period. Predicted water level rises ranging from approximately 100 feet to 800 feet were predicted over the transmissivity and storage estimates incorporated into the final simulation. This suggests that for the conceptualized layout and injection quantities, regional ASR implementation is feasible within the basalt aquifers, provided that optimal hydrogeologic characteristics (sufficient transmissivities, storativities, and suitable aquifer water levels) can be demonstrated as part of more detailed design work.

Predicted water-level increases associated with ASR will vary in response to aquifer and geologic conditions and can affect ultimate storage capacity. It is not possible to simulate these effects with existing data. Evaluation of the effects of hydraulic boundaries would be a critical part of more detailed design analysis for this element.

Evaluation of the Potential for Surface Recharge

Two approaches were used to evaluate the volume and timing of water diverted to an infiltration pond and the subsequent timing and volume of return flow to the stream:

- Target Return Flow Profile. This approach identified a desired condition for ground water return flows, and examined the amount of infiltration and total area of infiltration ponds required to achieve the target infiltration profile.

- Water Supply in Excess of Entitlements and Flow Targets. This approach used the historical monthly availability of TWSA for the period from 1978 to 2000 to determine in which months there was water in excess of entitlements and flow targets in reservoir storage that could be diverted into infiltration ponds.

The second approach does not account for all operational flows, but is adequate for preliminary analysis. The results of these estimates suggest that an average infiltration capacity of 20 to 60 acre-feet (AF) per acre per month would be reasonable to expect for the study area. Based on these infiltration capacities, an area of 166 to 500 acres of land would be required to infiltrate 10,000 AF of water in one month. Details on the analysis are provided in the Technical Report on the Groundwater Storage Alternative (Ecology, 2009a).

5.5.2.5 Fish Habitat Enhancement Element

Alterations in floodplain and off-channel storage connectivity could result in long-term changes to ground water interaction with streams. In general, improvements to fish habitat would also result in improvements to near-channel ground water interaction and connectivity between stream channels and shallow/hyporheic ground water.

5.5.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on ground water were described in Section 5.3.2.1 of the January 2008 Draft Planning Report/EIS for surface recharge and municipal ASR. The analysis of the regional ASR program in Ecology (2009a) predicted water level rises ranging from approximately 100 feet to 800 feet. Ground water elevations near the injection wells and the centrally-located injection wells will have the most near-term, seasonal change. Evaluation of the effects of hydraulic boundaries would be performed as part of more detailed design analysis if this element is carried forward.

Long-term ground water level changes could result from interannual storage that is not recovered during an annual ASR cycle. These changes would accrue slowly from year to year depending on the cumulative amount of water injected to the basalt aquifers and the amount of water recovered from the basalt aquifers. Additional site specific studies would be conducted to more accurately characterize the potential increase in ground water levels, and as appropriate, determine mitigation.

5.5.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on ground water were described in Section 5.3.2.2 of the January 2008 Draft Planning Report/EIS.

5.5.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Ground water levels and quantity are expected to increase through additional recharge from storage facilities, riparian enhancements, wetland and wet meadow construction, and from floodplain enhancements. Some localized decreases in recharge are expected from improving conveyance facilities.

5.5.4 Mitigation Measures

Long-term impacts to ground water could be avoided or mitigated by conducting hydrogeological studies prior to the design and using the knowledge gained in the design, construction, and implementation of projects. The benefit of these studies would depend on the type and magnitude of project and the extent of study.

The timing of operational activities could be used to reduce the impact to ground water. Additionally, the use of artificial recharge or withdrawal could be considered as part of the impact management strategy. Monitoring during operations would document the effectiveness of management strategies implemented.

5.6 Water Quality

Water quality can be affected by construction activities, impoundment of water, the depth at which water is withdrawn from reservoirs, and the flow regime. Construction increases the risk of erosion and introduction of contaminants. Impounding water tends to increase water temperatures and can reduce dissolved oxygen (DO) levels. These adverse effects may be transported downstream depending on the level at which water is released from the reservoir. Release of water from the surface of the reservoir tends to transport warm, well oxygenated water downstream. The release of water from deeper in the reservoir can transport cooler, low DO water downstream depending on reservoir conditions. The effects on stream flows would depend on the temperature of water released, solar radiation, and ground water inflow.

5.6.1 No Action Alternative

Under the No Action Alternative, the existing activities, programs, and trends in the Yakima River basin will continue. Existing water quality issues and trends will persist or worsen lacking a comprehensive, integrated management program that provides a system-wide approach. Projects funded and scheduled under the No Action Alternative could have impacts to water quality similar to those described in the following sections. Water quality impacts of those projects would be identified in separate NEPA or SEPA analysis, as appropriate.

5.6.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

In general, components of the Integrated Water Resource Management Alternative are intended to provide net water resource benefits, including water quality improvements. However, some impacts could occur. Long-term impacts to water quality that could occur include migration of contaminated soils that are in newly inundated areas to surface or ground water, and leaching and migration of subsurface natural and artificial contaminants. The water quality impacts for specific projects would be described in future site-specific investigations.

5.6.2.1 Fish Passage Element

Seasonal operation of the constructed fish passage elements could increase the delivery of organic debris, sediment, and nutrients to downstream waters. New spill gates and outflow structures could potentially influence the entrainment of air into water and thereby affect total dissolved gas levels. However, design and operation of these facilities would be aimed at improving fish habitat. Therefore it is unlikely that total dissolved gas levels would be increased to the extent that they would exceed water quality standards or adversely affect fish.

5.6.2.2 Modifying Existing Structures and Facilities Element

Altering stream flows in the Yakima River and its tributaries could seasonally alter stream temperatures and associated DO concentrations. The magnitude of cooling/warming effects and associated changes in DO concentrations would vary depending on the location and season of altered flows. Water quality standards could be exceeded by warmer temperatures or lower DO levels, which could adversely affect fish, especially during spawning and incubation. Increased mainstem flows would provide additional dilution of contaminants.

5.6.2.3 New Storage Element

The extent of impacts associated with new storage would depend on the size and location of the facility. In general, larger projects would have a higher likelihood of causing substantial effects (both positive and negative). For example, expanding Bumping Lake capacity to 450,000 acre-feet would have greater effects than expanding it to 200,000 acre-feet. Long-term impacts could include seasonal increases in downstream sediment loading and gas entrainment, debris impoundment, changes to downstream riparian vegetation, decreased downstream turbidity, increased downstream temperature, increased eutrophication of impounded water, and increased pollutant accumulation in the impounded water.

Long-term water quality improvements from new storage facilities would result from flow releases to meet minimum flow requirements for fish (Reclamation, 1979). However, if downstream flow releases are of a lower quality (e.g., warmer temperature) than existing ground water base flows, discharges could degrade surface water quality. Differences between the chemistry of flow releases and existing ground water could cause chemical reactions that would result in precipitation of minerals, changes to the taste or odor of the water, or biological changes (i.e., coliform, algae, or microbial). Recreational use on the new and/or enlarged reservoirs could also decrease water quality through addition of oils and greases from water craft, nutrients, or invasive aquatic plants introduced by boats.

5.6.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on ground water were described in Section 5.6.2.3 of the January 2008 Draft Planning Report/EIS.

5.6.2.5 Fish Habitat Enhancement Element

Inundation of lands for habitat restoration, wetland or wet meadow creation, and floodplain connectivity could result in the introduction of chemical constituents to surface waters. Chemicals deposited in soils during past land use practices may include pesticides, herbicides, fertilizers, endocrine disruptors, hydrocarbons, and other hazardous residues. The impact of potential contaminants would depend on the contaminant concentrations, which are determined primarily by historic land use practices, and the ability of soils to absorb and/or bind contaminants. Free draining gravelly soils, for example, often have less capacity to adsorb some contaminants than less permeable soils with high organic content. Riparian and wetland habitat enhancements would help remove instream contaminants and cool the water.

5.6.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on ground water were described in Section 5.6.2.1 of the January 2008 Draft Planning Report/EIS.

5.6.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on ground water were described in Section 5.6.2.2 of the January 2008 Draft Planning Report/EIS.

5.6.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Protection and enhancement benefits to water quality are expected to be based on the extent that implementing the elements as an integrated package improves stream flows. In addition, coordinating the activities under the Integrated Water Resource Management Alternative would facilitate better overall management of water quality from the actions implemented. This is expected to reduce the likelihood and magnitude of water quality impacts in comparison to conducting the individual water resource management elements individually.

5.6.4 Mitigation Measures

Mitigation of the long-term impacts to water quality could include controlling the depth at which water is drafted from reservoirs to minimize increased downstream temperature and decreased DO, allowing reservoir waters to cool by infiltration before recharging surface waters, providing sediment bypass facilities, and implementing nutrient control measures. Natural mixing and dilution could also help mitigate impacts to water quality. Recreational impacts could be minimized by restricting uses. Water quality impacts could further be mitigated through the use of evaluations that consider site-specific characteristics to aid in design and selection for individual improvements to be implemented.

Assessment of potential contaminants in soil prior to inundation would identify problem areas and allow for removal or stabilization of soils and sediments that might affect water quality.

Implementation of long-term management plans addressing water quality, recreation, frequently flooded areas, and riparian and wetland areas would also help maintain and enhance water quality. Monitoring reservoir and downstream water quality would document the effectiveness of water quality management strategies that are implemented.

5.7 Hydropower

5.7.1 No Action Alternative

The No Action Alternative is not expected to have long-term impacts on hydropower hydropower because no changes in flow through hydroelectric facilities are currently proposed for the programs listed in Section 2.2.

5.7.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.7.2.1 Fish Passage Element

The fish passage element is not expected to have long-term impacts on hydropower because no changes in flow through hydroelectric facilities would occur with this alternative.

5.7.2.2 Modifying Existing Structures and Facilities Element

The proposal to increase out-migration flow in the Yakima River below Roza Dam during the smolt migration period (April 1 to June 30) would reduce or eliminate power diversions, thereby reducing hydropower production for these three months. The actual reduction of power generated is unknown because the amount of flow desired below Roza Dam is yet to be determined. The rate of reduction of power generated is 10 kWh per cfs reduced each hour (Reclamation, 2002). The reduction in power generated for a range of flow increases from 50 cfs to 300 cfs was estimated by multiplying the rate of power reduction per cfs by the flow increase and length of time the increase occurs. Table 5-15 summarizes the estimated April to June reductions in generation and compares those reductions to the average amount of generation by the Roza Power Plant in April to June and total annual generation. The estimated reduction in power generated would range from 1,092,000 kWh for a 50 cfs flow increase to 6,552,000 kWh for a 300 cfs flow increase. The total annual generation by the power plant averages 55,535,300 kWh.

Table 5-25 Estimated Reduction in Power Generated for Roza Power Plant

Increase in Yakima River Flow (cfs)	Reduction in Power Generated (kWh)		
	April	May	June
50	360,000	372,000	360,000
100	720,000	744,000	720,000
150	1,080,000	1,116,000	1,080,000
200	1,440,000	1,488,000	1,440,000
250	1,800,000	1,860,000	1,800,000
300	2,160,000	2,232,000	2,160,000
Average Gross Generation (1981-1999)	*6,100,000*	*7,100,000*	*7,600,000*
Roza Irrigation Pump Requirements (1981-1999)	*3,050,000*		*5,350,000*
Annual Average Gross Generation (1981-1999)	*55,535,300*		
Annual Average Net Marketed Generation (1981-1999)	*18,974,100*		

Source: Reclamation, 2002

Subordination of Chandler Power Plant Diversions in Spring

The proposal to increase the minimum flow level between April and June in the Yakima River below Prosser Dam (currently at 1,000 cfs) would reduce generation at the Chandler Power Plant. The actual reduction of power generated is unknown because the amount of flow increase has not been determined. The rate of reduction of power generated is 10 kWh per cfs reduced each hour (Reclamation, 2002). The reduction in power generated for a range of new minimum flows from 1,100 cfs to 2,000 cfs was estimated by multiplying the rate of power reduction per cfs by the flow increase and length of time the increase occurs. Since minimum flows are not always present, the reduction in power generation was computed to occur only when flows exceeded 1,100 cfs and only up to the amount of flow available for diversion into Chandler Canal for hydropower generation purposes. Table 5-16 summarizes the estimated April through June reductions in generation and compares those reductions to the average amount of generation by the Chandler Power Plant in April through June and total annual generation. The estimated reduction in power generated would range from 236,700 kWh for a new minimum flow level of 1,100 cfs to 2,174,000 kWh for a new minimum flow level of 2,000 cfs. The total annual generation by the power plant averages 49,500,000 kWh. The reduction in power generated is based on an average of flows from 1995-2004.

Table 5-26 Estimated Reduction in Power Generated for Chandler Power Plant (1995-2004)

New Minimum Flow Level below Prosser Dam (Apr-Jun) (cfs)	Reduction in Power Generated (kWh)		
	April	May	June
1,100	62,200	66,300	108,200
1,200	132,100	147,900	155,100
1,300	168,300	248,600	202,600
1,400	187,100	347,000	261,200
1,500	212,100	453,400	337,500
1,600	252,100	554,100	416,300
1,700	299,200	659,100	493,300
1,800	348,500	770,200	566,400
1,900	411,000	879,400	637,900
2,000	493,500	974,500	706,000
Average Net Generation (1995-2004)	*4,600,000*	*3,900,000*	*2,600,000*
Average Annual Net Generation (1995-2004)	*45,900,000*		

Sources: Reclamation, 2002; Reclamation, no date

Structural Changes to Existing Facilities

Wapato Irrigation Project Improvements

Installing a pumping plant would increase the electricity demand in the area and could slightly reduce hydroelectric generation at the two power plants owned by the Bureau of Indian Affairs and operated by WIP.

Changes to Chandler Juvenile Bypass Outfall

This project is not expected to have long-term impacts on hydropower because the project would not change flow through any hydroelectric facility.

KID Pump Exchange Project

Installing a pumping plant would increase electricity demand in the area.

KRD Canal Modifications to Improve Tributary Flows

Lateral Piping Projects along the Main Canal and South Branch Canal

This project is not expected to have long-term impacts on hydropower because the project would not change flow through any hydroelectric facility.

Pumping near Tail End of Canal

Installing a pumping plant would increase the electricity demand in the area but would not affect hydroelectric generation because the project would not change flow through any hydroelectric facility.

Complete the Wapatox Project

This project is not expected to have long-term impacts on hydropower as the project would not change flow through any hydroelectric facility.

5.7.2.3 New Storage Element

Constructing additional storage may have long-term impacts on hydropower. Additional storage would cause a slight increase in electricity demand from operations; however, these increases are expected to have a negligible impact on hydropower availability. The Wymer reservoir, if fed by a pump station at Thorp, would increase electricity demand. If hydroelectric facilities were added to Wymer, Bumping, or other storage project, this could increase hydroelectric generation in the project area and offset pumping costs. In addition, the increased storage volume available may allow additional diversions into the Roza Power Plant, increasing hydroelectric generation. The hydrologic model showed an increase in generation equivalent to approximately 5 million kWh per year which would likely offset any other subordination impacts of hydroelectric generation at the Roza Power Plant.

Creation of new storage would cause a slight reduction of the amount of hydropower generated at dams on the Columbia River below the confluence of the Yakima River—McNary, John Day, The Dalles, and Bonneville Dams. The impacts would depend on the operation of the new storage, but hydropower generation could decrease in the winter and spring as a new reservoir is filled, and increase in the summer as flow is released out of storage to improve stream flow. If the water stored for irrigation is only used during drought years, a reduction in hydroelectric generation may only occur in years when the reservoir is refilling after being used for irrigation water supply. These changes are expected to be small compared to the current amount of hydropower generation occurring at these four dams.

5.7.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on hydropower were described in Section 5.4.2.3 of the January 2008 Draft Planning Report/EIS.

5.7.2.5 Fish Habitat Enhancement Element

This project is not expected to have long-term impacts on hydropower as the project would not change flow through any hydroelectric facility.

5.7.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on hydropower were described in Section 5.4.2.1 of the January 2008 Draft Planning Report/EIS.

5.7.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on hydropower were described in Section 5.4.2.2 of the January 2008 Draft Planning Report/EIS.

5.7.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Implementing the elements under the Integrated Water Resource Management Alternative as an integrated package would result in a combination of effects including a reduction of hydroelectric generation at the Roza and Chandler Power Plants and at the two in-line power plants in the WIP. A slight reduction in hydroelectric generation at dams along the Columbia River would occur when a new reservoir is refilling after the irrigation portion of the water stored is used during a drought year. Additional demand for electricity would occur from some elements of the Integrated Water Resource Management Alternative, including a large pump station to feed Wymer reservoir. The combination of energy recovery at Roza Dam and generation due to improved flows in the Yakima River may offset any impacts from pumping at Thorp and subordination at Roza Dam. If a hydroelectric generation facility is feasible at the new reservoir sites, then the overall effect may be an offset of pumping costs and possibly an increase in hydroelectric generation.

5.7.4 Mitigation Measures

No mitigation measures are proposed because the impacts are not expected to be significant, especially with an offset of pumping costs by an increase in hydroelectric generation at a new reservoir site. Any changes in hydropower generation would be coordinated with Bonneville Power Administration, Reclamation, and other affected agencies.

5.8 Vegetation and Wildlife

5.8.1 No Action Alternative

Some of the individual actions proposed under the No Action Alternative involve riparian vegetation improvement or alteration of wildlife habitats and species using those habitats. This includes projects for water storage, artificial supplementation programs, and fish passage and habitat improvements. The projects would likely include removal of nonnative vegetation and planting with native plants. Improved riparian vegetation would result in increased habitat for terrestrial wildlife species. Some projects could reduce the amount of shrub-steppe vegetation, but that impact is expected to be minor because most areas are already disturbed. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the vegetation and wildlife impacts from construction would be prepared separately.

5.8.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.8.2.1 Fish Passage Element

Construction of fish passage facilities could result in permanent removal of vegetation and displacement of wildlife. However, at Keechulus, Kachess, Cle Elum, and Rimrock Lakes, much of the area where construction would occur is currently absent of vegetation. Structures placed in the drawdown zone of the lakes would not result in vegetation impacts. Construction areas would be adjacent to existing spillways or dam abutments and embankments, where vegetation is nonexistent of limited to grasses. Minor effects to the habitat could occur through the removal of a few mature Douglas fir or other conifers for construction of the adult fish collection facilities and access roads. Conifer removal would be minimized to the extent possible.

According to Reclamation (2008c) the fish passage conduit at Cle Elum Lake would permanently replace about 7,600 square feet of Douglas fir, black cottonwood, lodgepole pine, and chokecherry along with the dirt roadway adjacent to the existing spillway facilities. The adult fish collection facility downstream, adjacent to the Cle Elum River, would permanently eliminate about 23,700 square feet of riparian and second-growth Douglas fir, black cottonwood, lodgepole pine, and chokecherry. About 2,600 feet of existing access roads would be upgraded and 550 feet of new road would be constructed, resulting in some habitat losses.

At Bumping Lake, the construction area lies entirely within the spotted owl Critical Habitat Unit (CHU) Number 6: Southeast Washington Cascades (USFWS, 2008a). The adult fish collection facility including the fish ladder, loading slab, building, fish lock, and holding pool would permanently replace about 19,600 square feet of riparian and second-growth Douglas fir habitat (Reclamation, 2008c). An old-growth stand of western red cedar is present to the northeast of the proposed facility location. The footprint of the fish collection facility has been adjusted to minimize overlap with the stand, but there would be a potential for adversely impacting a small portion of this habitat. The fish passage conduit would be constructed in the dam embankment, across a disturbed area at the foot of the dam and into the river, resulting in the permanent loss of a small stand of trees and riparian vegetation. This would cause minimal impacts to wildlife because the area of impact is small and adjacent suitable habitat is available.

Based on the current level of disturbance at the reservoir dams and the minimal loss of vegetation for fish passage facility construction, impacts to wildlife are anticipated to be minimal at Keechulus, Kachess, Cle Elum, and Rimrock Lakes. Human activities associated with the operation of the juvenile passage intake structures, the adult fish collection facilities, and the trap and haul trucks would increase in the project areas and may result in long-term disturbance to wildlife.

The fish passage element of the program would expand the available fish habitat to higher mountain streams in the Yakima Basin. The reintroduction of anadromous fish would have overall long-term ecosystem benefits by restoring food web interactions between invertebrates, fish and mammals. Migrating, spawning and juvenile fish are a vital forage base for many birds, mammals and other fish. Spawned fish carcasses and eggs are also an important source of nutrient inputs to streams and increase the biomass available to the benthic invertebrate community.

5.8.2.2 Modifying Existing Structures and Facilities Element

The majority of the proposed modifications would result in no impacts to plants and wildlife because they are located in areas already disturbed and developed. Wildlife in the vicinity are accustomed to existing activity levels, which would not change significantly. The piping of the five laterals on the Main Canal and five laterals on the South Branch Canal of the KRD would result in the loss of some temporary ponds and wetlands present along the canal. These artificial wetlands are sustained by leakage from the canal and provide habitat for amphibians, birds and other wildlife. The piping of canals would remove the hydrology source of these wetlands over time and result in a loss of this habitat within this portion of the KRD.

5.8.2.3 New Storage Element

Construction of new storage facilities has the greatest potential for impacts to vegetation and wildlife. A new reservoir would permanently remove vegetation and displace wildlife from the reservoir area. The size and location of the facility would be proportionate to the degree of alteration to wildlife and vegetation communities. Larger facilities are expected to cause greater impacts. Site specific studies of existing vegetation and wildlife species using the reservoir area would be constructed prior to facility design and construction at all proposed facilities.

Construction of a new rock-fill dam downstream of the existing Bumping Lake Dam and enlargement of the reservoir would result in the flooding of forested communities above the current level of Bumping Lake. The expansion would increase the current 1,300-acre reservoir to 4,120 acres under the large option, and 3,500 acres under the small option (Figure 2-4). The forest communities surrounding the lake are second-growth conifer forest supporting a canopy of lodgepole pine, western hemlock, western red cedar, Englemann spruce, and a dense shrub understory. The January 2008 Draft Planning Report/EIS Section 2.9.1 (Reclamation and Ecology, 2008) states that approximately 2,800 acres of terrestrial habitat, including about 1,900 acres of old growth habitat, would be inundated if Bumping Lake were enlarged to a capacity of 400,000 to 458,000 AF.

Forest communities within the expansion zone would be lost over time due to prolonged inundation and replaced by open water. The majority of impacts would occur to forested communities east of the lake and within the Deep Creek drainage area, outside of wilderness areas. If rare plants or rare plant communities are present within the expansion zone, these would be adversely affected. Site specific studies would be necessary to determine if such species are present. Habitats at the lake edge used by wildlife for nesting or foraging would be lost, but could be replaced in the long-term once vegetation at the new lake edge stabilizes. Mobile wildlife species would be permanently displaced to adjacent suitable habitats. Travel corridors for wildlife would also be impacted by the change in lake level, likely resulting in adverse effects to elk, deer, and small mammals. Loss of forest communities surrounding Bumping Lake could also adversely affect some listed and priority species known to occur in the vicinity, including wolverine, western toad, common loon, and spotted owl. If Bumping Lake or a similar area is selected for new or expanded storage, additional studies would be required to document wildlife species in the area and potential impacts to those species.

Construction of water conveyance routes for the proposed Wymer reservoir, including the North and South Branch Options, could result in vegetation removal. The enlargement of existing canals or construction of new canals would likely permanently remove vegetation. Most of these facilities would be located in already disturbed areas. Impacts to shrub-steppe habitat that could result from construction of the Wymer reservoir were previously evaluated in Section 4.7.2.4 of the January 2008 Draft Planning Report/EIS.

Construction of the storage reservoir in Pine Hollow would result in flooding of the grassy vegetation and replacing an area of disturbed shrub-steppe vegetation with an artificial lake (Ecology, 2005). After construction, the earthen dam would be planted with native vegetation, which would provide improved habitat for wildlife. The reservoir would be drawn down during the summer, leaving exposed mud flats at the upstream end of the reservoir. It is likely that a mix of native and non-native vegetation, including smartweed (*Polygonum sp.)* and cocklebur (*Xanthium sp*.), would colonize the mud flats during the summer. The reservoir would likely provide new habitat for waterfowl species, especially during spring and fall migration. Shorebirds may be attracted to the mud flat areas during fall migration. The loss of riparian vegetation along the Johncox Ditch would result in less protective vegetation cover for wildlife species such as small mammals, birds, and reptiles. The movement of small mammals and reptiles could also be blocked or altered by the new access roads and pipelines.

5.8.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on vegetation and wildlife were described in Section 5.7.2.3 of the January 2008 Draft Planning Report/EIS.

5.8.2.5 Fish Habitat Enhancement Element

The proposed habitat protection, restoration, and enhancement projects would improve native plant diversity and habitat for wildlife. Projects that reconnect side channels and/or create off-channel habitats would increase breeding habitat for amphibians. Stabilizing streambanks and restoring riparian areas would provide functioning habitats for many species of large and small mammals and birds.

5.8.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on vegetation and wildlife were described in Section 5.7.2.1 of the January 2008 Draft Planning Report/EIS.

5.8.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on vegetation and wildlife were described in Section 5.7.2.2 of the January 2008 Draft Planning Report/EIS.

5.8.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

The integrated elements would result in negative impacts to vegetation and wildlife using the area of a new reservoir or the proposed reservoir expansion adjacent to Bumping Lake. Impacts would be positive for vegetation and terrestrial wildlife along the mainstem and tributaries in the Yakima River basin. An integrated implementation of fish habitat enhancement projects and stream flow improvements would provide greater benefits to riparian vegetation and wildlife than implementing the elements separately because integrated management approaches are more likely to achieve system-wide benefits. Operational and structural changes to existing facilities are not anticipated to result in impacts because construction associated with these elements would occur in previously disturbed areas or built environments.

5.8.4 Mitigation Measures

Mitigation measures for potential impacts to vegetation and wildlife were described in Section 5.7.3 of the January 2008 Draft Planning Report/EIS. The impacts to vegetation and wildlife caused by the development of the required facilities and infrastructure would be mitigated through site and facility design to minimize the need for vegetation removal. The design should incorporate an evaluation of existing wildlife habitats and species in the vicinity and a rare plant survey. Habitat that is determined to be of significant importance (e.g., presence of listed species) should be preserved to the greatest extent possible. Facilities, access roads and staging areas should be located in areas of disturbed vegetation. If intact vegetation is present, the footprint of the facility should be minimized and situated to result in the least amount of disturbance.

Removal of mature trees should be avoided where possible in all construction areas. At Bumping Lake, the known stand of old-growth western red cedar located downstream of Bumping Lake Dam should be flagged by a qualified forester or biologist and protected from disturbance. Staging and stockpile areas should be revegetated after construction. Native plant species appropriate for the vegetation community (e.g., riparian areas) should be used for all proposed restoration

5.9 Fish and Aquatic Resources

5.9.1 No Action Alternative

The No Action Alternative would not include a program of comprehensive, integrated water storage, fish passage, and habitat enhancement actions for the Yakima River basin. This alternative does include continued water conservation, fish recovery, and habitat restoration activities that would be undertaken by various agencies and individual entities in the Yakima River basin. Fish recovery and habitat restoration activities may be coordinated to some degree under other programs or processes, but may not be integrated with water storage, water conservation, and water management activities being implemented elsewhere in the basin. Without a comprehensive, integrated program, these activities, along with continuing, competing demands on limited water resources, floodplain habitat, and riparian zones, would continue to limit fish restoration opportunities in the Yakima River basin.

5.9.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

This section describes the long-term impacts that could be associated with implementation of individual elements under the Integrated Water Resource Management Alternative. This programmatic Supplemental Draft EIS does not evaluate the impacts of any specific project that may be proposed. Projects that could be proposed under this alternative would require additional environmental review depending on the extent of federal or state funding or permitting.

5.9.2.1 Fish Passage Element

The fish passage element of the Integrated Water Resource Management Alternative would address fish passage at existing Yakima River basin reservoirs in the following order of priority: Cle Elum, Bumping, Rimrock, Keechelus, and Kachess. Fish passage improvements would also be considered at Clear Lake Dam in conjunction with fish passage improvements at Rimrock Dam. There are currently no upstream or downstream fish passage facilities at any of the five dams. The lakes and tributaries upstream from these dams formerly supported large runs of anadromous salmonids, and have varying amounts and quality of potential spawning and rearing habitat suitable for anadromous salmon and steelhead. Prior to construction of the dams, non-anadromous fish species traveled back and forth between natural lakes and the river below (Reclamation, 2005a).

In 2005, Reclamation completed an assessment of a range of options and opportunities for providing fish passage and potentially reestablishing populations of anadromous salmonids in some tributaries upstream of Reclamation reservoirs. Based on this initial assessment, Reclamation determined that some form of upstream and downstream passage would be technically feasible at all storage projects. However, it identified the Cle Elum and Bumping River projects as priority drainages for reestablishing fish passage (Reclamation, 2005a).

Section 2.3.2 provides a general description of fish passage options and potential benefits at each of these five Yakima River basin reservoirs. Table 5-17 illustrates the relative benefit or impact to Chinook, coho, sockeye, steelhead, and bull trout life stages by stream reach within the Yakima basin as a result of restoring fish passage at each of the five reservoirs. Fish passage at some or all of the storage dams is said to be a key component for both steelhead and bull trout recovery, as well as for reestablishment of sockeye salmon in the Yakima River basin, and it offers significant benefits to Chinook and coho salmon that are not listed under the Endangered Species Act (ESA) (YBFWRB, 2008).

Based on the Viable Salmonid Population conceptual framework (McElhaney et al., 2000), restoring fish passage at man-made barriers has the potential to contribute to improved abundance, productivity, spatial structure, and diversity for salmonid populations. In the Yakima basin, draft viability criteria for Yakima basin steelhead populations was assigned an abundance/productivity risk of moderate and a spatial structure/diversity risk of moderate for the Satus and Toppenish populations. The Naches population was assigned a high abundance/productivity risk and a spatial structure/diversity risk of moderate. The Upper Yakima population was ranked high for both risk classes (ICTRT, 2007; YBFWRB, 2008). Under these conditions, restoring passage into previously blocked areas of the basin has the potential to significantly contribute to salmonid recovery.

Table 5-27 Summary of Impacts to Species by Life Stages from Fish Passage Improvements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Spring Chinook																
Adult Migration	•	○	•	---	○	---	---	●	○	○	○	---	---	---	---	---
Spawning & Incubation	•	○	•	---	○	---	---	●	○	○	○	---	---	---	---	---
Rearing	•	○	•	---	○	○	○	●	○	○	○	○	○	○	○	○
Smolts	●	○	●	---	○	○	○	●	○	○	○	○	○	○	○	○
Fall Chinook																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Coho																
Adult Migration	•	○	•	○	○	○	○	●	○	○	○	○	○	○	○	○
Spawning & Incubation	•	○	•	○	○	○	○	●	○	○	○	○	○	○	○	○
Rearing	•	○	•	○	○	○	○	●	○	○	○	○	○	○	○	○
Smolts	●	○	●	○	○	○	○	●	○	○	○	○	○	○	○	○
Sockeye																
Adult Migration	◒	○	◒	○	○	---	---	●	○	○	---	---	---	---	---	---
Spawning & Incubation	◒	---	◒	---	---	---	---	●	---	---	---	---	---	---	---	---
Rearing	◒	---	◒	---	---	---	---	●	---	---	---	---	---	---	---	---
Smolts	●	○	●	○	○	---	---	●	○	○	---	---	---	---	---	---
Steelhead																
Adult Migration	•	○	•	○	○	○	○	●	○	○	○	○	○	○	○	○
Spawning & Incubation	•	○	•	○	○	○	○	●	○	○	○	○	○	○	○	○
Rearing	•	○	•	○	○	○	○	●	○	○	○	○	○	○	○	○
Smolts	●	○	●	○	○	○	○	●	○	○	○	○	○	○	○	○
Bull Trout																
Adult Migration	●	○	●	---	○	---	---	●	○	○	○	○	○	○	---	○
Spawning & Incubation	◒	○	◒	---	---	---	---	●	---	---	○	○	○	○	---	○
Rearing	◒	○	◒	○	○	---	---	●	○	○	○	○	○	○	---	○

Table 5-27 Summary of Impacts to Species by Life Stages from Fish Passage Improvements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Spring Chinook																			
Adult Migration	○	◒	○	○	●	○	○	---	○	○	---	---	○	○	○	---	---	○	○
Spawning & Incubation	---	◒	○	○	●	○	○	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	○	◒	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	---	---
Smolts	○	●	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Fall Chinook																			
Adult Migration	---	---	---	---	---	---	---	---	○	○	---	---	○	○	○	---	---	○	○
Spawning & Incubation	---	---	---	---	---	---	---	---	○	○	---	---	○	○	○	---	---	○	○
Rearing	---	---	---	---	---	---	---	---	○	○	○	○	○	○	○	○	○	○	○
Smolts	---	---	---	---	---	---	---	---	○	○	○	○	○	○	○	○	○	○	○
Coho																			
Adult Migration	○	◒	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spawning & Incubation	○	◒	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	---	---
Rearing	○	◒	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	---	---
Smolts	○	●	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Sockeye																			
Adult Migration	○	●	○	○	●	○	○	---	○	○	---	---	○	○	○	---	---	○	○
Spawning & Incubation	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	○	●	○	○	●	○	○	---	○	○	---	---	○	○	○	---	---	---	---
Steelhead																			
Adult Migration	○	◒	○	○	●	○	○	○	○	○	---	---	○	○	○	○	○	○	○
Spawning & Incubation	○	◒	○	○	●	○	○	○	○	○	---	---	○	○	○	○	○	---	---
Rearing	○	◒	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	---	---
Smolts	○	●	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Bull Trout																			
Adult Migration	○	◒	○	○	●	○	○	○	---	---	---	○	---	---	---	---	---	---	---
Spawning & Incubation	---	◒	○	○	●	○	---	○	---	---	---	○	---	---	---	---	---	---	---
Rearing	---	◒	○	○	●	○	---	○	---	---	---	○	---	---	---	---	---	---	---

Symbol	● High Benefit	◒ Medium Benefit	· Low Benefit	○ No Change or Benefit	--- Not Applicable

Providing fish passage at the dams could increase or enhance populations of upper Yakima basin steelhead, coho salmon, and spring Chinook salmon. Fish passage would restore access to historically occupied habitat which would help restore life history and genetic diversity of salmonids, allow reintroduction of sockeye salmon back into the watersheds where they occurred historically, and reconnect isolated populations of bull trout and other resident fish species. Over time, anadromous salmonids would be expected to recolonize the watersheds upstream from the dams, taking advantage of available spawning and rearing habitat and improving the spatial structure, abundance and productivity of Yakima basin salmonid populations.

Fish biologists have developed quantitative estimates of sockeye and coho production potential upstream of Cle Elum and Bumping Dams to support fish facility construction planning and an anadromous fish reintroduction plan (Grabowski, 2007a, b, c, and d). Estimates for sockeye production in a fish-passable Cle Elum Lake range from 136,296 to 4,582,427 smolts, which could produce an adult return of 30,000 to 50,000 fish (Grabowski, (2007a). Sockeye production in a fish-passable Bumping Lake could range from 43,736 to 1,682,210 smolts, producing about 10,000 to 17,000 adults (Grabowski, 2007b). For coho, using an approach based on available rearing/overwintering habitat, Grabowski (2007c) estimated that 7,458 coho smolts could be produced in Bumping Lake, resulting in a return of approximately 410 adults. Coho smolt production in Cle Elum Lake was estimated at 30,818 coho salmon smolts, resulting in an adult return of 1,588 fish (Grabowski, 2007d). The author noted that significantly more smolts could be produced when using suitable spawning substrate area as a basis for smolt production calculations, but called those estimates optimistic, especially in light of values reported in other literature.

The potential increases or changes to anadromous salmonid production as a result of habitat expansion upstream of other reservoirs have not been calculated. Therefore, the length (in miles) of available and potentially accessible reservoir tributary habitat was previously used as a surrogate for production in the Reclamation Phase I assessment and is now applicable to the other dams where information about detailed production is not available (Reclamation, 2005a). Table 5-18 provides an estimated overall reservoir tributary stream length, in miles, of suitable spawning and rearing habitat that would be potentially accessible to anadromous salmonids if passage were provided at the five dams. The table includes additional detail on individual tributaries to the five reservoirs and the quantity of potentially accessible tributary habitat that would likely be available.

Table 5-28 Potentially Accessible Stream Reaches	
Dams and Tributary Streams[a]	**Potentially Accessible (miles)**
Keechelus Dam	
Meadow Creek	3.9
Gold Creek	7.0
Cold Creek	1.9[c]
Mill Creek	0.2
Coal Creek	2.5
Townsend Creek	0.2
Total stream length to natural or manmade barrier	13.8
Kachess Dam	
Kachess River	0.5
Box Canyon Creek	1.6
Mineral Creek	0.25
Gale Creek[b]	1.5
Thetis Creek[b]	1.0
Total stream length to natural or manmade barrier	2.4
Cle Elum Dam	
Cle Elum River	21.6
Thorp Creek	0.0
Cooper River	0.6
Waptus River	7.2
Total stream length to natural or manmade barrier	29.4
Bumping Lake Dam	
Bumping River	1.0
Deep Creek	5.0-5.6
Total stream length to natural or manmade barrier	6.0-6.6
Tieton Dam	
South Fork Tieton River	13.5
Short and Dirty Creek	0.1
Corral Creek	2.2
Bear Creek (South Fork Tieton)	0.5
Bear Creek (Rimrock)	3.7
North Fork Tieton River	9.9
Clear Creek	2.0
Indian Creek	4.9
Total stream length to natural or manmade barrier	36.8

Source: Reclamation, 2005b

[a] Other tributaries were considered too small or steep to support migratory fish.
[b] Since Gale Creek and Thetis Creek commonly go subsurface, they are not considered as being accessible to anadromous salmonids, and the overall tributary stream length is 2.4 miles.
[c] If barrier at Cold Creek is repaired.

Restoring fish passage at Reclamation reservoirs alone would not be sufficient to restore sustainable salmon and steelhead populations upstream of the reservoirs. The Yakima basin fisheries co-managers—the Yakama Nation and WDFW—have determined that some level of artificial supplementation would be necessary. Considering the significant costs involved in planning, engineering, constructing, operating, and maintaining even temporary fish passage facilities at reservoir dams, the fisheries co-managers and Reclamation determined that waiting for existing fish populations downstream of the dams to colonize or "pioneer" newly accessible upstream habitat would not be acceptable (Reclamation, 2005b). It could take three or four salmon generations (15 to 20 years) or more to realize significant use of habitat above the reservoirs if fish reintroduction, especially for sockeye salmon, is not aided by human intervention.

Supplementation would contribute to recovery of sustainable populations by reintroducing those species extirpated from the Yakima basin with locally adapted broodstock (sockeye and coho salmon) and support the more rapid establishment of fish numbers capable of taking advantage of newly available habitats (Reclamation, 2005a; Reclamation, 2008c). Toward this goal, the fisheries co-managers have developed plans for anadromous fish reintroduction upstream of the dams (Reclamation, 2005b).

The primary benefit to reestablishing anadromous salmonid passage upstream of the dams would be the reintroduction of sockeye salmon, which utilize the lake environment for juvenile rearing. Sockeye were extirpated from the Yakima basin by 1933 and therefore are not listed under ESA. Sockeye salmon apparently played a substantial ecological role in the upper mainstem Yakima River. The available information suggests that the bulk of the sockeye salmon run returned to Cle Elum Lake, Kachess Lake, and Keechelus Lake. Bumping Lake in the Naches River basin was a relatively small contributor to the overall population. The infusion of marine-derived nutrients into the system from these returning sockeye salmon, as well as other salmon species, would have contributed to the overall productivity of the upper mainstem Yakima River for all species. Restoration of these sockeye salmon and other anadromous salmonid runs would help restore some of this historical nutrient input and associated increased productivity. Kokanee occur in all lakes and apparently spawn successfully in tributaries. Some shoreline spawning is believed to occur in at least some of the lakes. Successful kokanee reproduction may indicate that restoration of sockeye salmon might be successful.

Steelhead reintroduction above the dams is considered a "long-term" objective. Steelhead are an ESA-listed species; however, the native, wild stock of steelhead that is currently present in the Yakima basin is not fully utilizing all of the accessible spawning and rearing habitat downstream of the dams. Therefore, the fisheries do-managers have determined that it is premature to attempt to expand their distribution (Reclamation 2005b).

Reintroduction of spring Chinook above Yakima Project storage dams is considered a "long-term" objective because all smolts produced at the Cle Elum Supplementation and Research Facility (CESRF) are fully allocated to a sophisticated experimental design and cannot be used for reintroduction experiments at this time (Reclamation, 2005b).

Bull trout abundance would be expected to expand due to enhanced connectivity and interaction among the presently isolated populations, and expanded foraging and overwintering habitat. Restoring connectivity among presently isolated populations of bull trout would allow for dispersal of fish among local populations, providing a mechanism for supporting weaker populations or restarting those that might become extirpated. It would also allow for gene flow among populations, which would prevent the loss of genetic variation that would insure survival in variable environments and thus decrease the probability of local extirpations.

5.9.2.2 Modifying Existing Structures and Facilities Element

Modifying existing water diversion structures and operations would provide opportunities to improve water supply for irrigation while providing benefits to fish. Operational changes proposed include reducing the amount of water diverted for power generation at the Roza and Chandler Power Plants in spring to increase instream flow and improve smolt out-migration. Structural changes include modifying fish bypass systems and canals, and moving points of diversion to increase flows in reaches of the Yakima River. Historical changes in stream flows related to development of irrigation systems have contributed to the decline of anadromous salmonids in Yakima basin streams (YBFWRB, 2008). Restoring and maintaining appropriate stream flows would improve habitat restoration benefits in tributary reaches that have been negatively impacted by diversion withdrawals or system operations.

Structural and operational changes could improve stream flows and water quality in some reaches. This would benefit adult and juvenile salmonid survival by reducing travel times, and decreasing predation exposure, physical injury, and stress at facilities, thereby reducing smolt mortality. Table 5-29 illustrates the relative benefit or impact to life stages of Chinook, coho, sockeye, steelhead, and bull trout by stream reach within the Yakima basin as a result of modifying existing structures and operations. Operational changes proposed include reducing the amount of water diverted for power generation at the Roza and Chandler Power Plants in spring to increase instream flow and improve smolt out-migration. Structural changes include modifying fish bypass systems and canals, and moving points of diversion to increase flows in reaches of the Yakima River.

Table 5-29 Summary of Impacts to Species by Life States from Structural Modifications – Upper, Middle, and Lower Yakima River

Species and Life Stage	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Spring Chinook																
Adult Migration	---	○	---	---	○	---	---	---	○	○	○	---	○	○	---	---
Spawning & Incubation	---	○	---	---	○	---	---	---	○	○	○	---	○	○	---	---
Rearing	---	○	---	---	○	•	•	---	○	○	○	○	•	•	○	○
Smolts	---	○	---	---	○	•	•	---	○	○	○	○	•	•	○	○
Fall Chinook																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Coho																
Adult Migration	---	○	---	○	○	●	●	---	○	○	○	○	●	●	○	○
Spawning & Incubation	---	○	---	○	○	•	•	---	○	○	○	○	•	•	○	○
Rearing	---	○	---	○	○	●	●	---	○	○	○	○	●	●	○	○
Smolts	---	○	---	○	○	•	•	---	○	○	○	○	•	•	○	○
Sockeye																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Steelhead																
Adult Migration	---	○	---	○	○	•	•	---	○	○	○	○	•	•	○	○
Spawning & Incubation	---	○	---	○	○	◒	◒	---	○	○	○	○	◒	◒	○	○
Rearing	---	○	---	○	○	●	●	---	○	○	○	○	●	●	○	○
Smolts	---	○	---	○	○	•	•	---	○	○	○	○	•	•	○	○
Bull Trout																
Adult Migration	○	○	---	○	○	---	---	○	○	○	○	○	○	○	---	○
Spawning & Incubation	○	○	---	○	---	---	---	○	---	---	○	○	○	○	---	○
Rearing	○	○	---	○	○	---	---	○	○	○	○	○	○	○	---	○

Table 5-29 Summary of Impacts to Species by Life States from Structural Modifications – Upper, Middle, and Lower Yakima River

Species and Life Stage	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Spring Chinook																			
Adult Migration	•	---	○	○	---	○	○	---	○	○	---	---	○	○	○	---	---	○	○
Spawning & Incubation	---	---	○	○	---	○	○	---	○	○	---	---	---	---	○	---	---	---	---
Rearing	•	---	○	○	---	○	◒	○	○	○	○	○	○	○	○	○	○	---	---
Smolts	●	---	○	○	---	○	•	○	◒	○	○	○	○	•	•	○	○	●	○
Fall Chinook																			
Adult Migration	---	---	---	---	---	---	---	---	○	○	---	---	○	○	○	---	---	○	○
Spawning & Incubation	---	---	---	---	---	---	---	---	○	○	---	---	○	○	○	---	---	○	○
Rearing	---	---	---	---	---	---	---	---	○	○	○	○	•	•	•	○	○	•	○
Smolts	---	---	---	---	---	---	---	---	◒	○	○	○	○	•	•	○	○	●	○
Coho																			
Adult Migration	○	---	○	○	---	○	•	○	○	○	○	○	○	○	○	○	○	◒	○
Spawning & Incubation	○	---	○	○	---	○	◒	○	○	○	○	○	○	○	○	○	○	---	---
Rearing	◒	---	○	○	---	○	●	○	○	○	○	○	•	•	•	○	○	---	---
Smolts	●	---	○	○	---	○	•	○	◒	○	○	○	○	•	•	○	○	●	○
Sockeye																			
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Steelhead																			
Adult Migration	•	---	○	○	---	○	•	○	○	○	---	○	○	○	○	○	○	◒	○
Spawning & Incubation	---	---	○	○	---	○	◒	○	○	○	---	○	○	○	○	○	○	---	---
Rearing	•	---	○	○	---	○	●	○	○	○	○	○	○	○	○	○	○	---	---
Smolts	●	---	○	○	---	○	•	○	◒	○	○	○	○	•	•	○	○	●	○
Bull Trout																			
Adult Migration	•	○	○	○	○	○	•	○	---	---	---	○	---	---	---	---	---	---	---
Spawning & Incubation	---	○	---	---	○	○	---	○	---	---	---	○	---	---	---	---	---	---	---
Rearing	---	○	○	○	○	○	---	○	---	---	---	○	---	---	---	---	---	---	---

Symbol	● High Benefit	◒ Medium Benefit	• Low Benefit	○ No Change or Benefit	––– Not Applicable

Improved stream flows as a result of moving the WIP Satus diversion from Wapato Dam downstream to a new pump station near Granger would benefit all salmon and steelhead species and life stages by increasing instream flows in the WIP-diversion-to-Granger reach (25 river miles) during the irrigation season. Improving stream flows in the spring would benefit adult migrants attempting to move upstream and benefit smolts migrating downstream. Both life stages require adequate flows to allow passage and decrease migration times.

KRD canal modifications (piping laterals) would benefit most life stages for spring Chinook, coho, and steelhead in Taneum and Manastash Creeks; adult and juvenile coho and steelhead in Big and Little Creeks; and rearing spring Chinook in Big and Little Creeks. These benefits would result from allowing greater opportunity to augment stream flows in these affected tributaries to the Yakima River during migration, spawning, and rearing periods. The estimated savings of approximately 15 cfs throughout the irrigation season would help address stream flow problems that negatively affect fish passage and survival in the affected reaches. The option of placing a pump station with a pressurized system at the lowest end of the KRD South Branch Canal would provide a slightly greater flow (25 cfs) to augment the affected tributaries, thereby further contributing to improved flow conditions.

Modifying the current configuration of the Chandler Dam juvenile bypass on the lower Yakima River would increase juvenile survival at this structure by improving egress conditions at the bypass exit, thereby reducing predation on juveniles at this facility. This would benefit all species of anadromous salmonids found in the Yakima basin.

Two proposals to reduce or eliminate water diversions for power generation during the spring smolt outmigration season (April 1 to June 30) would increase stream flows in the middle and lower Yakima River reaches. These changes would benefit all species of salmonid smolts in the basin which have their peak migration during this period. The proposals would benefit migrating spring Chinook and coho salmon since their migration period is most specifically tied to April and May. If sockeye are reintroduced in the future, sockeye smolts would also migrate during this period and would benefit from these changes. Age 0 summer and fall Chinook smolt migration peaks in early to mid June and would also benefit from these changes. The System Operations Advisory Committee (SOAC) in the Yakima subbasin has established March 25 to June 30, annually, as the spring smolt outmigration period for its purpose of monitoring and managing the juvenile spring smolt outmigration. SOAC’s recommendations for duration of spring flows needed for the purpose of benefitting spring smolt outmigration would be considered when evaluating potential benefits.

Flows diverted to generate power at Roza Dam would instead remain in the Yakima River between Roza Dam and the discharge location 15 miles downstream, benefitting fish use in this mainstem reach. The proposal to increase minimum flows in the reach of the Yakima River affected by operations at the Chandler Power Plant would contribute to improved stream flows in the lower river from Prosser Dam to the power plant return 12 miles downstream. Current operations divert water to run the Chandler Power Plant and maintain minimum flows of 1,000 cfs in this reach. An increase in minimum flows in the

Yakima River during April through June would contribute to improved smolt survival in this lower river reach by reducing travel times, especially in the pool upstream of Chandler Dam, and reducing juvenile entrainment in the power plant diversion. This would reduce mortality rates associated with the canal and the plant outfall.

Modifying the water conveyance system for the Wapatox Project would free up the remainder of the 350 cfs power generation water right owned by Reclamation and augment flow in 7.4 miles of the lower Naches River. This would benefit spring Chinook, coho, and steelhead adult and juvenile migrants spawning and rearing in this reach of the Naches River. If summer Chinook salmon are reintroduced to the basin, they would also benefit from this modification because they are expected to use this reach for spawning and rearing.

Modifying existing water diversion structures and operations alone is likely not sufficient to support the restoration of sustainable salmon and steelhead populations in the Yakima basin. Having appropriate instream flows with acceptable water quality year-round will be critical to salmonid survival. Habitat restoration actions, coupled with restoring fish passage into historic habitat, would be a necessary component of meeting fish survival targets in coordination with modifying existing water diversion structures and operations.

5.9.2.3 New Storage Element

The new storage element of the Integrated Water Resource Management Alternative would address opportunities to expand existing water storage facilities or construct new facilities. New storage would support increased flows for anadromous and resident fish passage and survival during drought years while improving irrigation water supply and future municipal growth.

Section 2.3.4 of this Supplemental Draft EIS describes the proposed storage options, including their potential benefits. Table 5-30 illustrates the relative benefit or impact to life stages of Chinook, coho, sockeye, steelhead, and bull trout by stream reach within the Yakima basin as a result of expanding existing water storage facilities or constructing new facilities.

Table 5-30 Summary of Impacts to Species by Life Stage from Storage Elements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
Spring Chinook																
Adult Migration	---	○	---	---	○	---	---	---	○	○	○	---	---	---	---	---
Spawning & Incubation	---	○	---	---	○	---	---	---	•	○	○	---	---	---	---	---
Rearing	---	○	---	---	○	○	○	---	◒	•	○	○	○	○	○	○
Smolts	---	○	---	---	○	○	○	---	○	○	○	○	○	○	○	•
Fall Chinook																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Coho																
Adult Migration	---	○	---	○	○	○	○	---	•	○	○	○	○	○	○	○
Spawning & Incubation	---	○	---	○	○	○	○	---	◒	○	○	○	○	○	○	○
Rearing	---	○	---	○	○	○	○	---	◒	•	○	○	○	○	○	○
Smolts	---	○	---	○	○	○	○	---	○	•	○	○	○	○	○	•
Sockeye																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Steelhead																
Adult Migration	---	○	---	---	○	○	○	---	○	○	○	○	○	○	○	○
Spawning & Incubation	---	○	---	---	○	○	○	---	○	○	○	○	○	○	○	○
Rearing	---	○	---	---	○	○	○	---	◒	○	○	○	○	○	○	○
Smolts	---	○	---	---	○	○	○	---	○	•	○	○	○	○	○	•
Bull Trout																
Adult Migration	○	○	---	---	○	---	---	○	○	○	○	○	○	○	---	○
Spawning & Incubation	○	○	---	---	---	---	---	○	---	---	○	○	○	○	---	○
Rearing	○	○	---	○	○	---	---	○	•	•	○	○	○	○	---	○

Table 5-30 Summary of Impacts to Species by Life Stage from Storage Elements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Spring Chinook																			
Adult Migration	○	---	•	•	---	○	•	---	•	•	---	---	•	•	○	---	---	○	○
Spawning & Incubation	---	---	○	○	---	○	○	---	○	○	---	---	---	---	○	---	---	---	---
Rearing	○	---	○	○	---	○	•	○	•	○	○	•	○	○	○	○	○	---	---
Smolts	•	---	•	•	---	•	•	○	•	•	○	○	•	•	○	○	○	○	○
Fall Chinook																			
Adult Migration	---	---	---	---	---	---	---	---	○	○	---	---	○	○	○	---	---	○	○
Spawning & Incubation	---	---	---	---	---	---	---	---	○	○	---	---	○	○	○	---	---	○	○
Rearing	---	---	---	---	---	---	---	---	•	•	○	•	•	•	○	○	○	○	○
Smolts	---	---	---	---	---	---	---	---	•	•	○	○	•	•	○	○	○	○	○
Coho																			
Adult Migration	○	---	○	○	---	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spawning & Incubation	○	---	○	○	---	○	○	○	○	○	○	○	○	○	○	○	○	---	---
Rearing	○	---	•	•	---	○	•	○	•	•	○	◒	•	•	○	○	○	---	---
Smolts	•	---	•	•	---	•	•	○	•	•	○	○	•	•	○	○	○	○	○
Sockeye																			
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Steelhead																			
Adult Migration	○	---	•	•	---	○	○	○	○	○	---	○	○	○	○	○	○	○	○
Spawning & Incubation	---	---	•	•	---	○	○	○	○	○	---	•	○	○	○	○	○	---	---
Rearing	○	---	•	•	---	○	○	○	•	○	○	◒	○	○	○	○	○	---	---
Smolts	•	---	•	•	---	•	•	○	•	•	○	○	•	•	○	○	○	○	○
Bull Trout																			
Adult Migration	○	•	○	○	○	○	○	○	---	---	---	•	---	---	---	---	---	---	---
Spawning & Incubation	---	◒	○	○	○	○	---	○	---	---	---	○	---	---	---	---	---	---	---
Rearing	---	•	•	•	○	○	---	○	---	---	---	•	---	---	---	---	---	---	---

Symbol	● High Benefit/● High Impact	◒ Medium Benefit/◒ Medium Impact	• Low Benefit/• Low Impact	○ No Change or Benefit	--- Not Applicable

Construction or expansion of storage in the Yakima basin has the potential for both positive and negative impacts to salmonid fish populations. Additional storage would provide flexibility for altering operations among the Yakima basin reservoirs. However, new operations would need to be developed with consideration of the tradeoffs in benefits between species based on the additional water storage available. Constructing the Wymer reservoir could provide opportunities for Reclamation to slightly reduce the impacts of the "flip-flop" operation and benefit salmonids in the Tieton River and the lower Naches River. Expanding storage at Bumping Reservoir would also provide opportunities for Reclamation to increase spring outmigration flows in the Bumping, Naches and Yakima Rivers.

Restoring a more natural fall flow regime in the Tieton and Naches Rivers would benefit juvenile spring Chinook, coho, and steelhead rearing in the affected river reaches. Under current river operations, high flows are produced in the fall by increasing outflow out of Rimrock Lake when water supply is switched between Cle Elum and Rimrock Lakes. The switch in operations is intended to meet downstream water needs in the late irrigation season, and it flushes rearing juvenile steelhead and spring Chinook from the Tieton and lower Naches system.

Concerns exist regarding the potential for negatively affecting what are now mostly unregulated flows in the Naches River basin as a result of expanding water storage. However, the operations proposed for Bumping Lake would account for spring runoff and allow fish managers to time the releases from the reservoir and increase spring flows in drought years, which currently suffer from a severe shortfall in flow. Water would be released from Bumping Reservoir to augment spring flow in the Bumping, Naches and Yakima Rivers below the Parker gage in drought years. This release would increase smolt outmigration flows by 1,000 cfs, a very large increase relative to the flows at the Parker gage during drought years.

Also associated with an increase in storage at Bumping Lake is an increased area of impact. A new dam would inundate approximately 10 miles of perennial and intermittent stream habitat downstream from the existing dam and upstream of the existing reservoir, affecting the aquatic ecosystem and fishery resources. Bull trout inhabit Bumping Lake and its tributaries above Bumping Lake Dam. The inundated area includes portions of Deep Creek and the Bumping River that are designated as critical bull trout habitat (Reclamation and Ecology, 2008). Deep Creek appears to be the primary tributary of Bumping Lake where bull trout spawn. However, the new dam that would be constructed would include fish passage facilities and would open up habitat. The bull trout population previously isolated upstream of the dam would experience restored historic connectivity to other habitats and an increased gene flow among other populations in the Yakima basin (USFWS, 2001b).

Construction of small tributary water storage projects, such as Pine Hollow reservoir on Ahtanum Creek, has the potential to benefit but also negatively impact salmonid populations in the Yakima River basin. If smaller tributary water storage projects were designed like the Pine Hollow reservoir alternative to provide water supply and fish benefits, the impacts to salmonids could be avoided, minimized, and mitigated (Ecology, 2005a). Impacts might include altering the flow regime of a stream such that it negatively affects adult or juvenile migration, spawning, or rearing; blocking fish passage at the dam structure; or inundating spawning or rearing habitat. Benefits of a small storage project to instream flows during late summer or early fall or during drought years may be small. However, if adequate storage existed, fish benefits might include operating the storage facility to provide late season instream flows for rearing juvenile fish downstream of the facility.

5.9.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on fish and aquatic resources were described in Sections 5.8.2.4, 5.9.2.4, and 5.10.2.3 of the January 2008 Draft Planning Report/EIS.

5.9.2.5 Fish Habitat Enhancement Element

Historically, fish habitat in the Yakima River basin has been significantly altered. Properly functioning habitat in the Yakima basin area is characterized by an adequate supply of cool, clear water with minimal fine sediments, channels with stable banks and abundant and appropriate substrates (e.g., spawning gravels for salmonids), and plentiful streamside vegetation. Thus, the emphasis for habitat enhancement projects is placed on restoring and protecting natural channel function and associated habitat, most importantly within the floodplain. Activities could include habitat enhancements such as:

- Reconnecting and reestablishing floodplains and side channels;
- Enhancing and restoring riparian habitat conditions; and
- Increasing channel complexity.

The purpose of the enhancements is to restore or reestablish more natural channel and floodplain conditions for fish and aquatic communities. Therefore, long-term impacts from these projects are expected to be beneficial and to improve overall habitat function.

Anadromous Fish

Beneficial impacts would occur that are specific to different life history stages of anadromous salmonids using the affected area. These benefits would improve the growth, survival, and abundance of salmonids in various ways. For all anadromous salmonids, incubating eggs and juveniles would benefit from reduced fines in the stream and decreased water temperatures afforded by ample streamside vegetation and stable banks. Rearing juveniles would benefit from the increased prey availability (terrestrial insects) and increased organic matter input resulting from improvements in riparian vegetation. Growth and survival of juveniles would benefit from increased habitat in reconnected side-channels. In addition, juvenile survival would benefit from refuge cover from large woody debris (LWD) or boulder complexes and the increase in quality and quantity of pool habitats formed by these structures.

Survival of all adult life stages would benefit because of increased quality and quantity of holding habitat (pools) for spawners via in-channel LWD and boulders. These structures would also benefit spawning adults because they tend to trap and retain spawning-sized gravels in the reach. Off-channel spawners would benefit via an increase in floodplain and off-channel habitats. In addition, spawner condition would benefit from riparian vegetation enhancement and the related decrease in water temperatures.

The following discusses the benefits of fish habitat enhancement to Yakima and Naches basin salmonids within general river reaches in each basin. Table 5-31 provides a summary of life stages benefits within more detailed reaches in the basins.

Table 5-31 Summary of Impacts to Species by Life Stage from Fish Habitat Enhancement Elements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Spring Chinook																
Adult Migration	---	•	---	---	•	---	---	---	•	•	◒	---	---	---	---	---
Spawning & Incubation	---	•	---	---	•	---	---	---	•	◒	◒	---	---	---	---	---
Rearing	---	•	---	---	•	•	•	---	◒	◒	◒	•	•	•	•	◒
Smolts	---	○	---	---	○	○	○	---	○	○	○	○	○	○	○	○
Fall Chinook																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Coho																
Adult Migration	---	•	---	○	•	◒	◒	---	•	•	◒	◒	◒	◒	◒	◒
Spawning & Incubation	---	•	---	○	◒	◒	◒	---	•	◒	●	●	◒	◒	●	●
Rearing	---	•	---	○	◒	◒	◒	---	◒	●	●	●	◒	◒	●	●
Smolts	---	○	---	○	○	○	○	---	○	○	○	○	○	○	○	○
Sockeye																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Steelhead																
Adult Migration	---	•	---	○	•	◒	◒	---	•	•	◒	◒	•	•	◒	•
Spawning & Incubation	---	•	---	○	◒	◒	◒	---	◒	◒	●	●	◒	◒	●	●
Rearing	---	•	---	○	◒	◒	◒	---	◒	●	●	●	◒	◒	●	●
Smolts	---	○	---	○	○	○	○	---	○	○	○	○	○	○	○	○
Bull Trout																
Adult Migration	○	•	---	---	•	---	---	○	•	•	●	◒	◒	◒	---	◒
Spawning & Incubation	○	•	---	---	---	---	---	○	---	---	●	◒	◒	◒	---	◒
Rearing	○	•	---	○	◒	---	---	○	•	•	●	◒	◒	◒	---	◒

Table 5-31 Summary of Impacts to Species by Life Stage from Fish Habitat Enhancement Elements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Spring Chinook																			
Adult Migration	•	---	•	•	---	•	•	---	•	•	---	---	•	•	•	---	---	○	○
Spawning & Incubation	---	---	•	◒	---	◒	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	•	---	◒	◒	---	◒	◒	•	◒	◒	◒	◒	•	◒	◒	•	•	---	---
Smolts	○	---	○	○	---	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Fall Chinook																			
Adult Migration	---	---	---	---	---	---	---	---	•	•	---	---	•	◒	◒	---	---	•	•
Spawning & Incubation	---	---	---	---	---	---	---	---	◒	◒	---	---	◒	●	●	---	---	◒	◒
Rearing	---	---	---	---	---	---	---	---	●	●	•	•	◒	●	●	•	•	◒	◒
Smolts	---	---	---	---	---	---	---	---	○	○	○	○	○	○	○	○	○	○	○
Coho																			
Adult Migration	•	---	•	•	---	◒	◒	◒	•	•	◒	◒	◒	◒	•	◒	◒	•	•
Spawning & Incubation	◒	---	•	◒	---	◒	◒	◒	◒	◒	◒	◒	○	◒	•	◒	◒	---	---
Rearing	◒	---	•	◒	---	◒	◒	◒	◒	◒	◒	◒	•	◒	•	◒	◒	---	---
Smolts	○	---	○	○	---	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Sockeye																			
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Steelhead																			
Adult Migration	•	---	•	•	---	•	•	•	•	•	---	•	•	•	◒	•	•	•	•
Spawning & Incubation	○	---	•	◒	---	◒	◒	◒	•	•	---	◒	○	○	○	◒	◒	---	---
Rearing	◒	---	•	◒	---	◒	◒	◒	◒	◒	◒	◒	•	◒	◒	◒	◒	---	---
Smolts	○	---	○	○	---	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Bull Trout																			
Adult Migration	◒	•	•	•	•	•	•	•	---	---	---	◒	---	---	---	---	---	---	---
Spawning & Incubation	---	•	•	•	•	•	---	•	---	---	---	◒	---	---	---	---	---	---	---
Rearing	---	•	•	•	•	•	---	•	---	---	---	◒	---	---	---	---	---	---	---

Symbol	● High Benefit	◒ Medium Benefit	• Low Benefit	○ No Change or Benefit	--- Not Applicable

Habitat enhancement in the upper Yakima River basin from Keechelus Dam to Roza Diversion would benefit spring Chinook, coho, steelhead, and bull trout, which all migrate, spawn, incubate, and rear in this reach or its tributaries. It would also benefit sockeye adults that migrate, spawn, and incubate there. In the middle Yakima Basin from Roza Diversion to Prosser Dam, spring Chinook, fall Chinook, coho, sockeye, steelhead and bull trout, all of which spawn, migrate, incubate, and rear in this reach or its tributaries would benefit. For the lower Yakima River from Prosser Dam to the Columbia River confluence, habitat enhancement would benefit fall Chinook which migrate, spawn, incubate, and rear in this reach. It would also benefit spring Chinook, coho, steelhead, and bull trout that migrate through as adults and rear there as juveniles. Sockeye adults would also benefit because upstream migration occurs there.

In the upper Naches River basin from Bumping Dam to the Tieton River confluence, fish habitat enhancement would benefit spring Chinook, steelhead, and bull trout because adult migration, spawning, incubation, and rearing all occur in this reach or its tributaries. Coho and sockeye adults would also benefit because upstream migration occurs in the reach; sockeye also spawn and incubate there. In the lower reach encompassing the Tieton River confluence to the Yakima River confluence, habitat enhancement would benefit spring Chinook and steelhead because adult migration, spawning, incubation, and rearing all occur in this reach or its tributaries. Coho, sockeye, and bull trout adults would also benefit because upstream migration occurs there.

Resident Fish and Aquatic Invertebrates

Resident fish and aquatic invertebrate communities would receive long-term benefits from habitat enhancement. Resident fish and aquatic invertebrates are discussed as a group here because their habitat needs are highly interconnected. Benefits provided are discussed below, organized by each habitat enhancement type.

Floodplain/side channel reconnection and reestablishment would provide improved connectivity between streams and adjacent riparian areas, floodplains, and uplands. It would also increase floodplain water storage capacity to provide more stable instream flows. This enhancement would reestablish the source for organic matter input and terrestrial insects to support aquatic invertebrate communities and provide prey for resident fish that rely upon these organisms for growth and survival. Rearing habitat for juvenile fish would be increased, as well as refuge habitat for fish seeking protection from high flows. The increase in side channels would also create an increase in spawning habitat for fish and invertebrates that reproduce in these areas.

Riparian habitat enhancement/ restoration would improve native streamside plant communities that provide habitat for assemblages of water-associated insects and invertebrates. It would also increase terrestrial organic matter and insect inputs to streams to support aquatic invertebrate communities that function as fish prey. Restoring vegetative cover along the stream banks would result in reduced water temperatures via minimized solar heating, which would help provide adequate conditions for resident fish and aquatic communities. These plants and trees would also increase bank stability as they protect soils from erosion. When trees senesce and fall into the stream, they would provide LWD that contributes to an increasingly complex channel form and diverse habitats for resident fish and invertebrates.

Increased channel complexity (LWD, channel reconstruction, boulders, etc.) would result in increased trapping of organic matter to support aquatic invertebrate communities and fish prey. In addition, complex channels would trap more gravels that provide appropriate substrates for these organisms. Diverse channel habitat would also promote increased bank stability and reduced sedimentation due to the structural protection afforded by the LWD and boulder complexes. These complexes would encourage increased scour around the structures, thereby increasing pool quality and quantity. The pools provide refuge habitat for resident fish and invertebrates.

5.9.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on fish and aquatic resources were described in Sections 5.8.2.2, 5.9.2.2, and 5.10.2.2 of the January 2008 Draft Planning Report/EIS.

5.9.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on fish and aquatic resources were described in Sections 5.8.2.3, 5.9.2.3, and 5.10.2.2 of the January 2008 Draft Planning Report/EIS.

5.9.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

The most evident long-term impact to fish resources would be the benefits of implementing the fish passage and fish habitat enhancement elements of the Integrated Water Resource Management Alternative. These elements, coupled with modifying existing irrigation supply structures and operations and creating new storage, would address many in-basin factors limiting the restoration of sustainable salmonid fish populations in the Yakima basin. The factors most responsible for limiting salmon, steelhead, and bull trout populations in the Yakima basin vary somewhat between watersheds, but are generally accepted to include an altered hydrograph, high water temperatures, fine sediment, fish passage barriers at Reclamation water storage reservoirs and associated irrigation facilities and operations, loss of floodplain and riparian function, and loss of instream habitat complexity. Thus, long-term impacts of the alternative addressing these factors are primarily expected to be beneficial.

Another long-term beneficial impact would come from implementing artificial supplementation programs for salmonid species consistent with the Anadromous Fish Reintroduction Plan (Reclamation, 2005b) concurrent with providing fish passage at Reclamation reservoirs, enhancing and restoring habitat, and improving opportunities to manage basin water resources to meet aquatic needs. These activities would benefit sockeye and coho salmon populations in the Yakima basin. Similarly, artificial supplementation programs to enhance spring Chinook salmon and summer and fall Chinook-run salmon are being implemented under the Yakima-Klickitat Fisheries Project by the fisheries co-managers, WDFW and the Yakama Nation. The Chinook enhancement programs have been designed to provide the best opportunity to recolonize habitats in the Yakima basin and to restore sustainable populations. Monitoring and evaluation activities associated with artificial production programs would assist fishery managers with minimizing supplementation program effects on other fish species and natural spawners.

Incorporating these elements into an integrated alternative is also considered the best opportunity to implement successful water storage projects in the Yakima basin to help meet irrigation and municipal water needs during drought years. Identifying and implementing water storage and facility improvement projects that also meet fish management needs is expected to have the highest likelihood of success over the long term. Table 5-32 illustrates the relative impacts or benefits to Chinook, coho, sockeye, steelhead, and bull trout life stages by stream reach as a result of implementing the elements of the Integrated Water Resource Management Alternative—fish passage, modification of existing structures and operations, new storage, and fish habitat enhancements—as an integrated package. The table reflects the discussion in this section and in Section 2.3.1.

Table 5-32 Summary of Impacts to Species by Life Stage from the Integrated Elements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Upper Yakima River															
								Cle Elum River Basin								
	Above Dam	Mainstem Reach	Above Dam	Mainstem Reach		Tributaries		Above Dam	Mainstem Reach	Mainstem Reach	Tributaries					
	Above Keechelus Dam	Keechelus Dam to Lake Easton	Above Kachess Dam	Kachess River	Yakima River from Easton to Cle Elum River	Big Creek	Little Creek	Above Cle Elum Dam	Cle Elum River	Yakima River from Cle Elum River to Roza Dam	Teanaway River/Jack Creek	Swauk Creek	Taneum Creek	Manastash Creek	Reecer Creek	Wilson/Naneum/Cherry/Coleman Creeks
Spring Chinook																
Adult Migration	•	•	•	---	•	---	---	•	•	•	◒	---	○	○	---	---
Spawning & Incubation	•	•	•	---	•	---	---	•	◒	◒	◒	---	○	○	---	---
Rearing	•	•	•	---	•	•	•	•	●	◒	◒	•	◒	◒	•	◒
Smolts	•	○	•	---	○	•	•	•	○	○	○	○	•	•	○	○
Fall Chinook																
Adult Migration	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spawning & Incubation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Coho																
Adult Migration	•	•	•	○	•	●	●	●	◒	•	◒	◒	●	●	◒	◒
Spawning & Incubation	•	•	•	○	◒	◒	◒	●	◒	◒	●	●	◒	◒	●	●
Rearing	•	•	•	○	◒	●	●	●	●	●	●	●	●	●	●	●
Smolts	•	○	•	○	○	•	•	•	○	○	○	○	•	•	○	○
Sockeye																
Adult Migration	◒	•	◒	○	○	---	---	●	○	○	---	---	---	---	---	---
Spawning & Incubation	◒	---	◒	---	---	---	---	●	---	---	---	---	---	---	---	---
Rearing	◒	---	◒	---	---	---	---	●	---	---	---	---	---	---	---	---
Smolts	◒	○	◒	---	○	---	---	●	○	○	○	○	○	○	○	○
Steelhead																
Adult Migration	•	•	•	○	•	◒	◒	●	•	•	◒	◒	◒	◒	◒	•
Spawning & Incubation	•	•	•	○	◒	●	●	●	◒	◒	●	●	●	●	●	●
Rearing	•	•	•	○	◒	●	●	●	●	◒	●	●	●	●	●	●
Smolts	•	○	•	○	○	•	•	●	○	○	○	○	•	•	○	○
Bull Trout																
Adult Migration	●	•	●	○	•	---	---	●	•	•	●	◒	◒	◒	---	◒
Spawning & Incubation	◒	•	◒	○	---	---	---	●	---	---	●	◒	◒	◒	---	◒
Rearing	◒	•	◒	○	◒	---	---	●	◒	◒	●	◒	◒	◒	---	◒

Table 5-32 Summary of Impacts to Species by Life Stage from the Integrated Elements – Upper, Middle, and Lower Yakima River

Species and Life Stage	Middle Yakima River from Roza Dam to Prosser Dam																	Lower Yakima River from Prosser Dam to the Columbia River	
		Naches River Basin																	
	Mainstem Reach	Above Dam	Mainstem Reach		Above Dam	Mainstem Reach		Tributary	Mainstem Reach		Tributary	Tributary	Mainstem Reach		Mainstem Reach	Tributaries		Mainstem Reach	Mainstem Reach
	Yakima River from Roza Dam to Confluence with Naches River	Above Bumping Dam	Bumping River from Bumping Dam to the Little Naches River	Upper Naches River from Bumping River Confluence to Confluence of Naches and Tieton Rivers	Above Rimrock Dam/Indian Creek	Tieton River from Tieton Dam to Confluence with Naches River	Lower Naches River from Naches/Tieton Confluence to Yakima River	Cowiche Creek	Yakima River from Naches River to Roza Power Plant Return	Yakima River from Roza Power Plant Return to Wapato Diversion Dam	Wide Hollow Creek	Ahtanum Creek	Yakima River from Wapato Diversion Dam to Sunnyside Diversion Dam	Yakima River from Sunnyside Diversion Dam to Marion Drain	Yakima River from Marion Drain to Prosser Dam	Toppenish Creek	Satus Creek	Yakima River from Prosser Dam to Chandler Canal Return	Yakima River from Chandler Canal Return to Columbia River
Spring Chinook																			
Adult Migration	◒	◒	◒	◒	●	•	◒	---	◒	•	---	•	◒	◒	•	---	---	○	○
Spawning & Incubation	---	◒	•	◒	●	◒	○	---	○	○	---	•	---	•	○	---	---	---	---
Rearing	◒	◒	◒	◒	●	◒	●	•	◒	◒	◒	◒	•	◒	◒	•	•	---	---
Smolts	●	◒	•	•	●	○	•	○	◒	•	○	○	•	•	○	○	○	●	○
Fall Chinook																			
Adult Migration	---	---	---	---	---	---	---	---	•	•	---	---	•	◒	◒	---	---	•	•
Spawning & Incubation	---	---	---	---	---	---	---	---	◒	◒	---	---	◒	●	●	---	---	◒	◒
Rearing	---	---	---	---	---	---	---	---	●	●	•	◒	●	●	●	•	•	◒	◒
Smolts	---	---	---	---	---	---	---	---	◒	•	○	○	•	•	○	○	○	●	○
Coho																			
Adult Migration	•	◒	•	•	●	◒	◒	◒	•	•	◒	◒	•	◒	•	◒	◒	•	•
Spawning & Incubation	◒	◒	•	◒	●	◒	●	◒	◒	◒	◒	◒	•	◒	•	◒	◒	---	---
Rearing	●	◒	◒	◒	●	◒	●	◒	◒	◒	◒	●	•	◒	◒	◒	◒	---	---
Smolts	●	◒	•	•	●	○	•	○	◒	•	○	○	•	•	○	○	○	●	○
Sockeye																			
Adult Migration	○	●	○	○	●	○	○	---	○	○	---	---	○	○	○	---	---	○	○
Spawning & Incubation	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rearing	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Smolts	●	●	•	•	●	○	•	○	◒	•	○	○	•	•	○	○	○	●	○
Steelhead																			
Adult Migration	◒	◒	•	◒	●	•	◒	•	•	•	•	•	•	•	◒	•	•	◒	•
Spawning & Incubation	○	◒	•	◒	●	◒	●	◒	•	•	•	◒	○	○	○	◒	◒	---	---
Rearing	◒	◒	◒	◒	●	◒	●	◒	◒	◒	◒	●	•	◒	◒	◒	◒	---	---
Smolts	●	◒	•	•	●	○	•	○	◒	•	○	○	•	•	○	○	○	●	○
Bull Trout																			
Adult Migration	◒	•	•	•	●	•	◒	•	---	---	---	◒	---	---	---	---	---	---	---
Spawning & Incubation	---	◒	•	•	●	•	---	•	---	---	---	◒	---	---	---	---	---	---	---
Rearing	---	•	◒	◒	●	•	---	•	---	---	---	◒	---	---	---	---	---	---	---

Symbol	● High Benefit/● High Impact	◒ Medium Benefit/◒ Medium Impact	• Low Benefit/• Low Impact	○ No Change or Benefit	--- Not Applicable

5.9.4 Mitigation Measures

As discussed in Sections 5.9.2 and 5.9.3, one of the goals of the Integrated Water Resource Management Alternative is to provide improved habitat and water conditions for fish and aquatic species. The long-term impacts to fish and aquatic species as a result of this alternative would primarily be beneficial to these species and their habitats. Specific projects would be evaluated through applicable environmental review and permitting processes. This evaluation may include review by federal or local scientific review panels and tribal councils as required by the applicable regulatory processes, and depending on funding source requirements. These requirements may stipulate that actions implemented under this alternative should be consistent with the federal, tribal, and regional salmon and steelhead recovery planning and watershed planning efforts. Thus, it is expected that particular mitigation measures would be identified that pertain to long-term impacts from specific proposed activities.

Some unavoidable long-term impacts may occur because some habitats would be negatively impacted in order to positively impact others elsewhere. An example of this is the expansion of water storage at Bumping Dam to benefit downstream flows and fish passage, which would require inundation of existing habitat at the storage site. Another example is the shifting of spring flows in the Naches basin that may result in reduction of fish attraction during salmonid upstream migration to certain streams. In either case, mitigation may be required and could include such actions as artificial spawning channels, constructed riffles, native plant species revegetation/enhancement, or other improvements that would benefit fish and aquatic species. These measures may not be necessary or may be reduced if the action(s) become part of a watershed restoration program that integrates habitat improvement.

5.10 Recreational Resources

5.10.1 No Action Alternative

The No Action Alternative would not result in direct long-term recreational resource impacts in the Yakima River basin. This alternative includes storage modification, supplementation, and fish enhancement projects that would likely be implemented by other agencies and special interest groups. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the recreational resource impacts from these projects would be prepared separately.

5.10.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

Long-term impacts would be primarily related to activities that may result in the loss of property used for recreational purposes, and in management and operational changes that alter the flow regime of the systems within the Yakima River basin. These elements are discussed in the following sections, and in Section 5.11.

5.10.2.1 Fish Passage Element

In general, the goal of all projects proposed as part of the fish passage element is to increase the amount of habitat available to fish species within the Yakima River basin by providing passage into areas currently blocked. This, in turn, could benefit recreational resources by increasing the number of areas available for fishing, as well as improving the amount of stock available within the basin. This would be a long-term beneficial impact.

No other long-term impacts to recreational resources are expected from the proposed fish passage element projects.

5.10.2.2 Modifying Existing Structures and Facilities Element

Operational and structural changes at existing facilities would be designed to benefit fish passage and survival rates within the affected reaches. This could be a long-term beneficial impact on recreational fishing opportunities.

No other long-term impacts to recreational resources are expected from modification of existing structures and facilities.

5.10.2.3 New Storage Element

The proposed Bumping Lake expansion would eliminate some recreational facilities in the area (Figure 2-4). All of the lakeshore access and associated facilities (e.g., boat launches and parking), several formal and informal campsites, vacation rentals, trails and trailheads, access roads, and other recreational facilities would be inundated by the expansion of the lake. New recreational facilities would be constructed, but would likely not be completed at the same time the Bumping Lake expansion project is completed. Therefore, recreational facilities would likely be unavailable during the construction years and possibly a year or two after construction completion. The impacts to recreational resources from the proposed expansion of Bumping Lake were further analyzed in the Proposed Bumping Lake Enlargement Final EIS prepared by Reclamation (Reclamation, 1979).

The proposed Pine Hollow reservoir could provide additional recreational opportunities, including boating and fishing (Ecology, 2005). Long-term impacts to recreational facilities for other storage options could be similar to those for the Bumping Lake expansion, though not likely as extensive, as the other proposed options would encompass a smaller area.

Creation of a new reservoir with construction of the Wymer Dam would create new recreational opportunities in that area. Section 4.12.2.4 of the January 2008 Draft Planning Report/EIS (Reclamation and Ecology, 2008) describes in detail the recreational setting for the potential Wymer reservoir. This would be a long-term beneficial impact by supplying new recreational activities.

Existing river operations result in low flows in the upper Naches River basin, specifically the Tieton River, through most of the irrigation season, and then high (essentially bank full) flows in the fall. As described in Section 3.10.1, whitewater rafters use the Class III rapids on the Tieton River that result from the additional water release. Construction of additional storage in the Naches River basin could slightly modify river operations in some years and reduce the higher flows on the Tieton River in the fall. Reduction or elimination of the rapids would constitute an impact to this recreational resource. Modification of river operations could, however, increase recreational fishing opportunities on the mainstem Yakima River during the summer months by reducing flows.

5.10.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on recreational resources were described in Section 5.12.2.3 of the January 2008 Draft Planning Report/EIS.

5.10.2.5 Fish Habitat Enhancement Element

Fish habitat enhancement projects would be designed to increase overall habitat area and fish survival rates within the affected reaches. This could be a long-term beneficial impact on recreational fishing opportunities.

Some of the proposed fish habitat enhancement projects would require the acquisition of land, or the placement of land in easements. This would not necessarily preclude the use of these lands for public access or recreational uses (e.g., fishing); however, the specific uses allowed within each area would be defined as conditions of project permitting.

5.10.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on recreational resources were described in Section 5.12.2.1 of the January 2008 Draft Planning Report/EIS.

5.10.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Ground Water Storage Element on recreational resources were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

5.10.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Implementation of the elements under the Integrated Water Resource Management Alternative would result in long-term impacts to recreational resources. However, recreational resources that are eliminated would be replaced over time. Collectively, the combined elements from the proposed projects would have a beneficial impact by making more of the basin available for recreational opportunities, such as fishing.

5.10.4 Mitigation Measures

Recreational facilities directly impacted, or eliminated, by implementation of various project components (e.g., the Bumping Lake expansion) would be replaced over time, as described in the Proposed Bumping Lake Enlargement Final EIS (Reclamation, 1979). Coordination between agencies during the planning and design phases would insure that replacement facilities will meet the public's needs and are completed within the shortest timeframe practicable.

5.11 Land and Shoreline Use

5.11.1 No Action Alternative

The No Action Alternative would not result in direct long-term land use impacts in the Yakima River basin. This alternative includes storage modification, supplementation, and fish enhancement projects that would likely be implemented by other agencies and special interest groups. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the long-term land use impacts of these projects would be prepared separately.

5.11.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.11.2.1 Fish Passage Element

No long-term impacts to land use are expected from the fish passage element projects. None of the proposed projects would require the acquisition of land or a change in land use.

5.11.2.2 Modifying Existing Structures and Facilities Element

Operational modifications associated with this element would not require a change in land use in the Yakima River basin. Some of the proposed projects, however, would require acquisitions of land or easements, such as for the lateral piping projects associated with the KRD canal modifications. Depending on the current use of the property to be acquired, this may constitute a change in land use.

5.11.2.3 New Storage Element

Most of the new storage options would require the acquisition of land or easements. For example, if the Pine Hollow reservoir is constructed, the lake site would have to be acquired by the implementing entity (Ecology, 2005). The Bumping Lake inundation area is currently managed by Reclamation and would not require acquisition. However, there are several privately-owned residences on the north shore of Bumping Lake, which would have to be acquired or relocated. Public recreational facilities, such as campgrounds and day-use areas, would also be inundated and would have to be constructed elsewhere. For additional information on recreational impacts, see Section 5.10.2.3 above.

5.11.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on land and shoreline use were described in Section 5.13.2.3 of the January 2008 Draft Planning Report/EIS.

5.11.2.5 Fish Habitat Enhancement Element

Some of the habitat enhancement options would also require the acquisition of property. The agencies sponsoring the individual enhancement projects could also work with property owners to place all or portions of their property in conservation easements. Both acquisition and placement of property in easements would constitute a change in land use.

5.11.2.6 Enhanced Water Conservation Element

The impacts of the Ground Water Storage Element on land and shoreline use were described in Section 5.12.2.1 of the January 2008 Draft Planning Report/EIS.

5.11.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on land and shoreline use were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

5.11.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Implementation of the elements under the Integrated Water Resource Management Alternative would result in long-term impacts to land use. However, the integrated projects are not expected to have disproportionately larger land use impacts than the individual projects described above.

5.11.4 Mitigation Measures

If individual projects are chosen that require the acquisition of land, appropriate compensation would be required in accordance with applicable state or federal regulations. Additional environmental analysis would be performed at the time specific projects are identified to determine any further impacts to land use, including compliance with all applicable policies and regulations.

5.12 Cultural Resources

5.12.1 No Action Alternative

Long-term impacts to cultural resources under the No Action Alternative would be similar to those described in Section 5.20.2 of the January 2008 Draft Planning Report/EIS. Projects undertaken by other agencies would undergo separate NEPA or SEPA analysis, as appropriate, and would comply with federal and state regulations that protect historic and cultural resources.

5.12.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

The long-term impacts to buried cultural resources from an integrated approach to water supply and fish habitat improvements would largely be related to operation of new facilities or changed water drainage patterns (such as meandering channels, increased/decreased flow). The main long-term impact for most elements would be erosion of cultural deposits.

5.12.2.1 Fish Passage Element

The long-term impacts to cultural resources from the fish passage improvements might include increased erosion of cultural deposits.

5.12.2.2 Modifying Existing Structures and Facilities Element

The long-term impacts to cultural resources for this element are considered minimal as any adverse impact would occur during construction.

5.12.2.3 New Storage Element

General Impacts

New or expanded storage facilities could adversely impact cultural resources over the long term. The impacts to cultural resources within reservoirs could include destruction or damage of archaeological sites, historic structures, or Traditional Cultural Properties (TCPs). There are generally three zones of impact to cultural resources in storage reservoir settings: the inundation zone, the direct impact (fluctuation or drawdown) zone, and the indirect impact (backshore) zone.

Archaeological sites can be damaged or destroyed through erosion, inundation, chemical weathering, vandalism/artifact collecting, and land development. These impacts often occur in combination. Of these, erosion by wind and water is the most predominant impact (Lenihan et al., 1981). Erosion impacts vary based on the site type, land form, severity of wind and water action, soil structure, and type of cultural resource. Depending on the fluctuation zone of the reservoir (the area between normal high and low water levels) and the angle of the landform slope, sites can slump, be washed out, or suffer bank calving. Inundation impacts cultural sites by making them inaccessible for research. The site may become covered with sediment, although there is some speculation that the sedimentation provides protection to the site. Artifacts and features may be damaged by long-term inundation due to changes in the chemical composition of the surrounding geologic matrix. No detailed studies have been conducted to evaluate the impacts of sedimentation on fragile archaeological deposits.

Chemical weathering impacts to archaeological sites could include damage to organic remains through repeated wetting and drying of archaeological deposits, leading to a loss of scientific potential of sites along reservoir boundaries. This impact is often linked to irrigation-related reservoirs (Galm and Masten, 1988).

Vandalism and artifact collecting could be expected, especially if a new reservoir provides recreational areas. Vandalism includes a range of activities from intentional looting of sites, to off-road vehicle use in culturally sensitive areas, to extended recreational use, which destabilizes soils. With increased boat use, more sites could be accessible and become vulnerable to vandalism. Increased boat use is also likely to increase erosion due to wake action. Rock art is often the target of graffiti. Site erosion often makes sites more susceptible to vandalism by increasing site exposure.

Land development in the areas surrounding a reservoir can include construction of roads and recreational facilities, grazing, agricultural or orchard uses, and increased residential, commercial, or industrial use. Grazing cattle can adversely affect cultural deposits up to a meter below ground surface as cattle come to water's edge to drink and wallow. The impacts to trampled sites are compounded by fluctuations in the shoreline and changes to soil chemistry related to manure.

Historic structures in the inundation and fluctuation zones would likely be removed prior to inundation. Historic structures in the backshore zone could have increased access, which often leads to increased vandalism. The increased proximity of water may adversely impact the significance of the historic structure by altering the integrity of its setting.

TCPs in the inundation zone would become permanently inaccessible. TCPs in the fluctuation zone would likely be so altered that even when exposed, they would lose their characteristics (such as isolation or resource availability), which provide their integrity of setting, feeling, or association. TCPs in the backshore zone may suffer adverse effects due to alteration of the integrity of setting, feeling, or association as well.

Specific Impacts on Bumping Lake and Pine Hollow Areas

At Bumping Lake, features related to the construction of the original dam, historic recreational residences, and recorded precontact archaeological sites are known to be present in the area proposed for expansion. As no formal surveys have been conducted of the area since the early 1990s, it is anticipated that some structures have become eligible for the National Register of Historic Places (i.e., are now older than 50 years). Even those cultural resources that would not be directly impacted by the enlargement of Bumping Lake might be affected in terms of changes to their association, setting, or feeling. Some of these impacts to the original dam may have been addressed in the mid 1990s (Reclamation 1993).

Impacts to historic and cultural resources at the proposed Pine Hollow reservoir were evaluated in the Programmatic EIS on the Ahtanum Creek Watershed Restoration Program (Ecology, 2005). The reservoir area has the potential for buried archaeological deposits, which could be impacted by the reservoir as described above.

5.12.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on cultural resources were described in Section 5.20.2.3 of the January 2008 Draft Planning Report/EIS.

5.12.2.5 Fish Habitat Enhancement Element

Long-term impacts to cultural resources associated with fish habitat enhancements might include increased erosion of cultural deposits.

5.12.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on cultural resources were described in Section 5.20.2.1 of the January 2008 Draft Planning Report/EIS.

5.12.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on cultural resources were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

5.12.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Long-term impacts of integrating the elements of the alternative are not expected to differ from implementing the elements individually. Projects that are implemented as part of a coordinated process might require more scrutiny of cultural resources because of state or federal funding.

5.12.4 Mitigation Measures

Mitigation measures would be similar to those discussed in Sections 4.20.2.4 and 5.20.3 of the January 2008 Draft Planning Report/EIS. The actual process to be followed to mitigate adverse effects would be determined by the regulatory nexus for the project element. Existing reservoirs within the region have ongoing programs for the life of the project to assure that operational changes, continuing erosion, and new project elements address cultural resources issues. Similar programs should be established at new or expanded reservoirs.

5.13 Socioeconomics

Consistent with the approach used in Section 5.14 of the January 2008 Draft Planning Report/EIS, as well as in Section 4.13, the assessment of long-term socioeconomic impacts and mitigation measures considers potential effects on the supply and value of goods and services derived from the basin’s water and related resources, resource-related jobs and incomes, resource-related uncertainty and risk, the distribution of resource-related costs and benefits, and the structure of the economy. This analysis is programmatic, and detailed determination of potential socioeconomic effects would be undertaken as specific projects are proposed.

5.13.1 No Action Alternative

Under this alternative, the current patterns and trends in the relationship between the basin’s natural resources and the state’s economy likely would continue into the foreseeable future. Over a long period of time, the socioeconomic characteristics of the basin's water and related resources, and their interaction with the regional and statewide economies, would reflect future changes in the ecosystem and the economy. These changes could include changes in climate and the ecosystem's responses to the changes, increases in human population and wealth, and adjustments in the demands for water-related goods and services arising from shifts in consumers' preferences.

5.13.1.1 Value of Goods and Services

All management decisions affecting water and related resources in the basin affect the ability of the ecosystem to produce goods and services. Actions that enhance the overall health of water-related ecosystems in the basin would strengthen their ability to produce multiple goods and services of value to Washingtonians, both those residing locally and those living elsewhere. The goods and services potentially affected by the No Action Alternative are described in Section 3.12.1, and in Section 5.14.1 of the January 2008 Draft Planning Report/EIS. The nature of the potential changes in the value of goods and services that Reclamation could quantify and monetize were described in the discussion of the No Action Alternative, in Section 5.14.2 of the January 2008 Draft Planning Report/EIS. Additional changes in the value of goods and services also likely would occur. Expected reductions in the populations of salmonids, for example, would reduce the value some people place on knowing that the populations will be robust and available for the enjoyment of future generations.

5.13.1.2 Jobs and Incomes

The future supply of water and related resources under the No Action Alternative likely would influence future levels of jobs and incomes via three mechanisms. One would materialize when resources become inputs to commercial activities, such as irrigated agriculture or water-related tourism. Another would materialize as the supply of water-related amenities, such as recreational opportunities and clean water in the Yakima River and its tributaries, affect the locational decisions of households and businesses, with an increase in the supply increasing the propensity for families and firms to locate nearby. The third mechanism would materialize as elements of the basin's water-related ecosystem affect the cost of living and doing business in the basin. Such impacts might occur, for example, if healthy wetlands and floodplains were to attenuate the extent of the damage resulting from future flood events, or if changes in water quantity or quality in streams were to affect the cost of securing and treating water for municipal and industrial use.

Current trends in jobs and incomes related to the basin's water and related resources likely would continue in the foreseeable future under the No Action Alternative. Total, water-related jobs and incomes would likely increase, both statewide and in the two economic regions that incorporate portions of the Yakima River basin. Section 5.14.1.2 of the January 2008 Draft Planning Report/EIS describes these regions—one centered on the Seattle-Tacoma-Olympia metropolitan areas, and the other centered on Kennewick, Pasco, and Richland. Total jobs and incomes in industries related to farming likely would grow slowly, if at all, although employment and incomes in some parts of the agricultural industry might experience shifts. Expansion of grape and wine production, for example, might generate growth in related jobs and incomes, while conversion of farmland to urban uses might eliminate jobs and incomes associated with farm production on those lands.

The Yakima River basin contains the full population of Kittitas and Yakima Counties, but only about 25 percent of Benton County's population. The three counties, respectively, contain about 12, 75, and 13 percent of the basin's total population (Kent 2004). Washington State's Office of Financial Management has estimated population and employment trends through 2030, as shown in Table 5-23. The data show that populations in Kittitas, Yakima, and Benton Counties and the State of Washington are expected to follow similar trajectories, with increases projected at around 15–20 percent by 2020 and at about 30-35 percent by 2030, compared to the 2010 estimate. When compared to the same 2010 base year, non-agricultural employment in Washington is projected to grow at rates lower than those of population, increasing by 12 percent by 2020 to almost 3.5 million jobs, and by 25 percent by 2030, to almost 3.8 million jobs. However, for the same time periods, agricultural employment exhibits trends in the opposite direction showing almost no growth, or 0.7 percent, by 2020, and a decline of nearly 50 percent by 2030.

Table 5-33 Trends in Population and Employment in the Yakima River Basin and State of Washington

Year	Population				Non-Agricultural Employment	Agricultural Employment
	Benton County	Kittitas County	Yakima County	Washington State	Washington State	Washington State
2010	188,913	43,901	259,917	7,372,751	3,060,800	326,800
2020	218,874	52,265	307,116	8,713,386	3,430,800	329,000
2030	248,358	60,322	352,476	10,026,660	3,835,600	170,900

Source: Office of Financial Management (2008a, 2008b)

Jobs and incomes related to municipal/industrial uses of water and related resources likely would grow, roughly parallel to population and overall economic growth. Jobs and incomes linked to water-related recreation likely would grow, roughly parallel to growth in population and wealth.

5.13.1.3 Uncertainty and Risk

Several types of economically important risk and uncertainty associated with the basin's water and related resources likely would worsen over the long term under the No Action Alternative. The risk of financial losses associated with potential shortfalls in the supply of water for irrigated agriculture likely would increase, as anticipated changes in climate increase the likelihood of low stream flows in late summer (Scott et al., 2007). This risk also would be exacerbated insofar as existing institutional and other barriers to water transfers and conservation persist (described in Section 5.14.1.4 of the January 2008 Draft Planning Report/EIS). These barriers would extend current patterns, with lower-value crops receiving water while higher-value crops go without.

Anticipated changes in climate could heighten other types of risk and uncertainty regarding increased probability of flooding in the winter and spring, higher temperatures and more heat waves, and diminished fish habitat in streams experiencing low and hot flows in late summer (Casola et al., 2005). Reductions in the quality of fish habitat also could raise the probability of adverse impacts on populations of salmon and steelhead and tighter restrictions on commercial and recreational fishing.

Under the No Action Alternative there might also be increased risk and uncertainty associated with potential future conflict over water and related resources. Reductions in fish habitat and in populations of salmon and steelhead, for example, might lead to increased pressure to restrict withdrawals of water for irrigation and to restrict land and water uses likely to have an adverse impact on habitat.

5.13.1.4 Distribution of Costs and Benefits

The future, long-term distribution of water-related costs and benefits under the No Action Alternative likely would remain similar to what it is today. The overall economic costs to the regional and statewide economies associated with individual uses of water and related resources likely would continue to exceed the financial costs the users, themselves, would incur. Thus, society as a whole would bear some portion of the total economic cost, known as the societal opportunity cost, as individual water users realize the benefits.

Irrigated agriculture likely would continue to account for most of the water withdrawals and consumption in the basin. Therefore, it also would account for most of the private benefits and societal opportunity costs associated with withdrawals and consumption. Other groups with significant private benefits and societal opportunity costs would include municipal and domestic users of water, those who would participate in water-related recreation in the basin, and those who would benefit from actions that protect water-related amenities. Societal opportunity costs would be borne by those who would prefer greater production of other water-related goods and services, such as those associated with fish habitat, wetlands, and native riparian vegetation, and by those who would provide financial resources to support the development and operation/maintenance of specific water uses.

5.13.1.5 Socioeconomic Structure

Water-related aspects of the basin’s economic structure, and its relationship to the overall state economy, likely would experience many long-term changes under the No Action Alternative, in response to changes in the ecosystem, the economy, laws governing resource management, and budgets available for resource managers. Overall, however, the future structure likely would largely resemble what exists currently. The basin likely would continue to produce commercial products, especially crops, derived from its water and related resources. These resources also likely would contribute to the economy by providing amenities that attract households and businesses, and by providing environmental services, such as natural filtration that lessens the costs municipal and industrial users would incur to obtain high-quality water. These impacts would not all occur at the same rate, so incremental shifts in the water-related economic structure likely would occur. These shifts may or may not stimulate change in the structure of institutions, policies, and programs affecting management of the basin's water and related resources.

5.13.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.13.2.1 Fish Passage Element

Value of Goods and Services

Improving fish passage would increase the long-term value of goods and services to the extent that it would lead to larger or more stable fish populations. Larger fish populations probably would increase the value of goods and services for those who place a value on the continued existence of the fish species; for those who harvest fish commercially, recreationally, or for cultural purposes; or for those who derive recreational value from watching salmon or other species in the water.

Improved fish passage also likely would have collateral effects on the value of other goods and services. Anadromous fish deliver nutrients derived from the ocean to the upstream ecosystem, stimulating growth in trees, birds, and other economically important species. Fish passage improvements may create new recreational opportunities. Some may derive value just from seeing fish bypass what were once insurmountable barriers, or from knowing that adverse impacts of past activities that created a barrier have been reversed.

Jobs and Incomes

Improvements in fish passage might have long-term impacts on jobs and incomes through several mechanisms. Jobs and incomes related to operation and maintenance would increase to the extent that the fish-passage facilities would have higher labor requirements than the facilities they modify. They would decrease if the reverse proved true. Reclamation (2008c) has estimated that the first-order impact of long-term expenditures associated with a potential fish passage project at Cle Elum Dam would be an increase of five to 12 jobs, and $100,800 to $252,200 in labor income. The analysis found that a similar project at Bumping Lake Dam would generate one to two long-term jobs, and $10,100 to $30,400 in labor income. These first-order impacts would be offset, more or less, by second-order effects that would materialize, for example, if the new jobs drew workers away from jobs elsewhere in the regional or statewide economies.

Expected increases in fish populations resulting from improved fish passage potentially could increase jobs and incomes associated with recreational and commercial fish harvest. Jobs and incomes with no direct relationship to fish or the fish passage facilities would increase if households and businesses perceive that the resulting impacts on fish populations and the overall natural environment are significant enough to alter their locational decisions. These first-order impacts also likely would be offset, more or less, by second-order impacts.

Uncertainty and Risk

Improving fish passage would reduce risk and uncertainty associated with salmon and steelhead to the extent that it would diminish the likelihood of severe future reductions in fish populations.

Distribution of Costs and Benefits

The long-term costs and benefits of improvements in fish passage likely would not be distributed equally among the same groups. This is especially the case to the extent that the costs would be borne by taxpayers and the benefits would be realized by a subset: those who would enjoy seeing greater fish populations, or catching more fish, for example. The costs and benefits would coincide insofar as taxpayers pay the costs and realize the benefits as nutrients delivered by anadromous fish improve the health of ecosystem resources owned by all citizens.

Socioeconomic Structure

Improvements in fish passage and resulting increases in fish populations likely would boost the recreational fishing industry and other components of the economy related to fish populations.

5.13.2.2 Modifying Existing Structures and Facilities Element

Value of Goods and Services

This element of the Integrated Water Resource Management Alternative likely would change the long-term supply of financial resources, land, and other resources dedicated to the structures as well as the supply of water for irrigation, instream flows, and other goods and services derived from the structures.

Jobs and Incomes

Long-term increases or decreases in expenditures on a modified structure or facility, relative to what would exist otherwise, would respectively increase or decrease jobs and incomes associated with the structure or facility. Similarly, increases or decreases in goods and services derived from the structure or facility—such as fish populations, recreational opportunities, and water for irrigation—likely would have a corresponding impact on jobs and incomes in commercial activities associated with them. In addition, any improvements or deterioration in natural resource amenities that affect the locational decisions of households and businesses also would have long-term impacts on related jobs and incomes. Any changes in the ecosystem’s ability to provide goods and services that affect the cost of living and doing business in the region also could affect jobs and incomes.

The initial impacts on jobs and incomes would be dampened to the extent that they trigger offsetting second-order impacts. An initial increase in jobs might, for example, draw workers from other jobs, which would remain unfilled, so the net impact would be near zero.

Uncertainty and Risk

Projects to modify existing structures and facilities would reduce long-term risk and uncertainty to the extent that they increase the reliability of the future supply of a good or service. Increased reliability in the supply of water for irrigation or instream flow, for example, would diminish the risk and uncertainty associated with the probability that irrigators would have too little water to irrigate crops, or that fish would have poor habitat conditions.

Distribution of Costs and Benefits

The long-term costs and benefits of modifications to existing structures and facilities likely would not be distributed equally among the same groups. This is especially the case to the extent that the costs would be borne by taxpayers and the benefits would be realized by a subset: recreationists who would enjoy larger fish populations, for example. The costs and benefits would coincide insofar as taxpayers pay the costs and realize the benefits of better health for ecosystem resources owned by all citizens.

Socioeconomic Structure

Modifications to structures and facilities likely would boost those elements of the economy that would enjoy increased supply of specific goods or services relative to those that would not. The recreational fishing industry would be reinforced, for example, if modifications were to increase fish populations.

5.13.2.3 New Storage Element

Value of Goods and Services

This element likely would change the long-term supply of several goods and services derived from the basin's water and related resources. An individual project might, for example, increase the supply of water for irrigated agriculture for some lands at some times, and increase the production of irrigated crops from those lands. New storage also might create new opportunities for recreational activities, such as reservoir-related water sports. The value of an initial increase in the production of some goods and services might be offset by second-order effects. An increase in the production of some crops resulting from new storage might, for example, reduce the price all producers in the state receive for the crop. Some recreationists might take advantage of the recreational opportunities at a new reservoir by reducing their recreational visits to similar sites at other reservoirs, so that the overall amount of recreational activity remains nearly unchanged.

Section 5.14.1.1 of the January 2008 Draft Planning Report/EIS presented general estimates of the value of incremental changes in the supply of water for irrigating crops, municipal/industrial use, and the production of some other goods and services. Section

5.14.2.2 of the January 2008 Draft Planning Report/EIS presented estimates of value derived from observed prices of transactions that transferred water from agricultural use to municipal use or to another agricultural use.

Jobs and Incomes

Long-term expenditures on a new storage facility likely would increase the demand for labor and generate new job opportunities and higher incomes for some workers. Similarly, increases in the supply of goods and services derived from the new storage structure—such as fish populations, recreational opportunities, and water for irrigation—likely would have a corresponding impact on jobs and incomes in commercial activities associated with them. The structure's impacts, positive or negative, on the basin's natural resource amenities that affect the locational decisions of households and businesses would have long-term impacts on related jobs and incomes.

Uncertainty and Risk

The development of new storage would reduce risks and uncertainties to the extent that it would increase the reliability of water to meet specific demands. If a new storage project increased the reliability of water for irrigators during periods when water supplies otherwise would be uncertain or less than irrigators' demands, it likely would induce the irrigators to increase crop production, and reduce the costs they would incur to compensate for risk and uncertainty. If new storage increased the reliability of water supplies to provide fish habitat during periods when stream flows otherwise would be lower and less favorable, then it might increase the habitat's ability to support larger fish populations, and enable fish and water managers to avoid the costs of alternative actions to improve habitat. Increased reliability in the supply of water for municipal/industrial users of water would allow them to avoid the costs of potential future shortages or the costs of finding other means for increasing reliability.

Distribution of Costs and Benefits

The long-term costs and benefits of new storage likely would not be distributed equally among the same groups. This is especially the case to the extent that the costs would be borne by taxpayers and the benefits would be realized by a subset: irrigators who would enjoy a more reliable supply of water, for example. The costs and benefits would coincide insofar as the taxpayers who would pay the costs also would realize the benefits of better health for ecosystem resources owned by all citizens.

Socioeconomic Structure

The development of new storage likely would boost those elements of the economy that would enjoy increased supply of specific goods or services relative to those that would not. The affected parts of the agricultural sector would be reinforced, for example, if new storage were to increase the reliability of water supplies for irrigation.

5.13.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on socioeconomics were described in Section 5.14.2.3 of the January 2008 Draft Planning Report/EIS for surface recharge and municipal ASR. The construction costs of the regional ASR approach are expected to range from $193 million to $419 million per wellfield depending on the treatment option chosen (new treatment plant or river bank filtration) and the total number of miles of transmission line needed. The cost per acre-foot of water from the regional ASR approach is estimated to range from $3,000 to $6,000 dollars per acre-foot of water. The lower costs are associated with river bank filtration as the preferred treatment method.

5.13.2.5 Fish Habitat Enhancement Element

Value of Goods and Services

Enhancing fish habitat likely would have a long-term effect on the value of goods and services derived from the basin's water and related resources to the extent that it would increase fish populations. Huppert et al. (2004) estimated the value Washingtonians place on changes in salmon populations at approximately $715 per fish (2003 dollars). Other studies also provide insight into the potential value of possible increases in salmon and steelhead populations. All estimates are in 2003 dollars. Goodstein and Matson (2007) found that, when households elsewhere were taken into account, the value of marginal increases in salmon populations in the Columbia River basin is $2,890 per fish. Loomis and White (1996) found that households in the U.S. were willing, on average, to pay $31 to $88 per household per year to ensure the survival of Pacific salmon and steelhead. Platt (2008) estimated the average value of recreational and commercial catch of different species originating in the Yakima River basin and found:

- The average recreational value per fish is about $101 for Chinook and $118 for coho caught in the ocean; $304 for all species caught in the lower Columbia River; and $462 for spring Chinook and $368 for fall Chinook and coho caught in the Yakima River basin.

- The average commercial profit per fish is about $26 for Chinook and $8 for coho caught in the ocean; $46 for spring Chinook, $15 for fall Chinook, and $6 for coho caught by the non-Indian commercial fishery in the lower Columbia River; and $23 for spring Chinook, $9 for fall Chinook, and $3 for coho caught by the Indian commercial fishery in the lower Columbia River.

- The lower-bound average value of fish for Indian ceremonial and subsistence uses (in the Yakima River basin and the Columbia River basin) is about $28 for spring Chinook, $11 for fall Chinook, and $4 for coho.

Enhancing fish habitat might increase the supply of goods and services other than those associated with catching salmon and steelhead. If other fish species were to benefit from the habitat enhancements and stimulate additional recreational fishing activities, for example, the current average value of such activities to those who participate in them is about $42 per person per day (Loomis, 2005). If the habitat enhancements were to induce increases in hunting and sightseeing, the current average value of these activities to those who participate in them is about $35 and $61 per person per day, respectively.

Habitat enhancements might increase the supply of other goods and services for which there does not exist an estimate of value. This does not mean that the value would be zero, but that analysts have not estimated the value to date. Implementation of the Integrated Water Resource Management Alternative might yield outcomes—improvements in water quality, changes in water-related landscapes, and improvements in the populations of some species—that many Washingtonians would consider to have positive economic value, for example, but there exist no market data or analytical studies that readily indicate the size of the value.

Jobs and Incomes

Fish habitat enhancements might increase or decrease long-term expenditures on the affected land, water, and other resources and, therefore, might lead to a long-term increase or decrease in related jobs and incomes. Enhancement of habitat might, for example, attract more visitors who leave more trash and increase expenditures, jobs, and incomes associated with clean-up. Or, it might expand the ability of wetlands and floodplains to accept high stream flows and reduce expenditures, jobs, and incomes related to downstream flooding.

Changes in commercial fishing, recreational fishing, sightseeing, and other activities that might result from enhanced fish habitat likely would lead to changes in the levels of jobs and incomes associated with these activities. Any changes in natural resource amenities that affect the locational decisions of households and businesses would have long-term impacts on related jobs and incomes.

The initial impacts on jobs and incomes would be dampened to the extent that they would trigger offsetting second-order impacts. An initial increase in jobs might, for example, draw workers from other jobs, which would remain unfilled, so the net impact would be near zero.

Uncertainty and Risk

Enhancing fish habitat would reduce risk and uncertainty associated with salmon and steelhead to the extent that it would diminish the likelihood of future severe reductions in fish populations.

Distribution of Costs and Benefits

The long-term costs and benefits of fish habitat enhancements likely would not be distributed equally among the same groups. This is especially the case to the extent that the costs would be borne by taxpayers and the benefits would be realized by a subset: those in the commercial fishing industry who would enjoy opportunities to increase their catch of salmon and steelhead, for example. The costs and benefits would coincide insofar as the taxpayers who would pay the costs also would realize the benefits of better health for ecosystem resources owned by all citizens.

Socioeconomic Structure

The enhancement of fish habitat likely would boost those elements of the economy that would enjoy increased fish populations relative to those that would not.

5.13.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on socioeconomics were described in Section 5.14.2.1 of the January 2008 Draft Planning Report/EIS.

5.13.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on socioeconomics were described in Section 5.14.2.2 of the January 2008 Draft Planning Report/EIS.

5.13.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

The long-term socioeconomic effects of the Integrated Water Resource Management Alternative may differ from the sum of the effects of the individual elements. Differences would arise to the extent that implementing the elements as a package would enable them to interact with one another in their impacts on the supply of goods and services derived from the basin's water and related resources, on resource-related expenditures, on resource-related risk and uncertainty, on the distribution of resource-related costs and benefits, or on the structure of the regional and statewide economies. If they reinforce one another, then the overall effect would be greater than the sum of their individual effects. If they interfere with one another, it would be smaller.

Interactive effects among the individual elements might emerge from sources peripheral to the economy. Biophysical systems might respond differently if the elements were implemented in an integrated manner than if they were implemented separately, for example. Similarly, resource-management systems and funding mechanisms might respond differently, so that the overall socioeconomic effects would be larger or smaller than the sum of the effects of the individual elements. Interactive effects also might occur within the economy itself. Households and businesses, for example, might alter their activities and investment decisions if they perceive that, with the Integrated Water Resource Management Alternative, the likelihood of a change in the supply of economically important goods and services would be significantly different than it would be if the different elements were implemented individually. Further investigation would be required to determine the potential for such interactive effects.

5.13.4 Construction Cost Estimate

5.13.4.1 Construction Cost Estimates for the Integrated Water Resource Management Alternative

Construction cost estimates for elements of the Integrated Water Resource Management Alternative were determined from cost estimates from previous studies where available. Costs were assumed to be based on costs as of April 2007 to be consistent with the Planning Report/EIS. When a cost estimate was used, Reclamation's composite trend of the construction index was applied to convert the previous cost estimate into April 2007 costs. Reclamation's Construction Cost Trends can be accessed at http://www.usbr.gov/pmts/estimate/cost_trend.html. Table 5-34 presents the values used for construction indices for 1986 to 2008.

Table 5-34 Construction Index – Composite Trend (1986-2008)

Year	Construction Index
2008	318
2007	309
2006	303
2005	288
2004	274
2003	250
2002	242
2001	236
2000	233
1999	227
1998	221
1997	218
1996	212
1995	207
1994	199
1993	194
1992	188
1991	185
1990	181
1989	176
1988	168
1987	162
1986	160

The cost estimates for the elements of the Integrated Water Resources Management Alternative are listed in Table 5-35. Not all costs are known and most cost estimates are preliminary. The total estimated costs for the fish passage element are $243.9 million. The total estimated costs for the Modifying Existing Structures and Operations Element range from $12 million to an unknown value. Those costs do not include the costs of the KID Pump Exchange Project, which are included in the Enhanced Water Conservation Element. The total estimated costs for the new surface water storage element could range up to $1.67 billion depending on the number and size of reservoirs constructed. The ground water storage element costs are estimated to range from $54 million to $164 million. The total estimated costs for the fish habitat enhancement element range from $115.8 million to an unknown value. The estimated costs of the Enhanced Water Conservation element are up to $405 million. The estimated costs of the Market-Based Reallocation of Water Resources Element is $45 million to $218 million. Combining the elements of the Integrated Water Resources Management Alternative into a comprehensive program that benefits water supply and fish could cost up to $2.8 billion if all the elements are implemented. However, not all of the projects are likely to be implemented. Specific projects for implementation will be selected as part of the comprehensive water resource implementation planning process. That process will weigh the costs and benefits of the various fish passage, storage, conservation, water marketing, and habitat restoration projects.

Table 5-35 Cost Estimates for Elements of the Integrated Water Resource Management Alternative

Element	Estimated Construction Cost	Construction Duration	Source
Fish Passage			
-Cle Elum Dam	$93,300,000	3 years	Reclamation, 2008c
-Bumping Dam	$26,200,000	2 years	Reclamation, 2008c
-Tieton Dam	$52,600,000	TBD	Reclamation, 2005a
-Keechelus Dam	$35,900,000	TBD	Reclamation, 2005a
-Kachess Dam	$35,900,000	TBD	Reclamation, 2005a
Subtotal – Fish Passage Element	***$243,900,000***		
Modifying Existing Structures and Operations			
-Operational Changes at Existing Facilities	$0	0 years	
-Structural Changes to Existing Facilities			
--WIP Granger pump station	TBD	TBD	
--Chandler Dam modifications	TBD	TBD	
-KRD Canal Modifications to Improve Tributary Flows			
--Lateral piping projects along Main Canal and South Branch Canal	$9,100,000	TBD	CH2M Hill, 1999
--Pumping near tail end of canal	TBD	TBD	
-Complete Wapatox Project	$2,900,000	TBD	Yakima Steelhead Recovery Plan, 2008
Subtotal - Modifying Existing Structures and Operations	***$12,000,000-unknown***		
New Storage			
-Naches River Storage Reservoirs			
--Bumping Lake large expansion	$315,800,000	6 years	Reclamation, 2006, 1979
--Bumping Lake small expansion	$213,200,000	4 years	Reclamation, 1986

Element	Estimated Construction Cost	Construction Duration	Source
--Other potential water storage sites	TBD	TBD	
-Wymer Dam (Thorp Pump Station to Canal or Pipeline along KRD North Branch Option)	$1,200,000,000	10 years	Reclamation, 2006; Montgomery Water Group, 2002
-Ahtanum Creek Watershed Restoration Program, Including Pine Hollow Reservoir	$151,700,000	TBD	Ecology, 2005a
Subtotal – New Storage (assuming Bumping Lake small expansion to all storage elements with Bumping Lake large expansion)	***$1,667,500,000***		
Ground Water Storage			
-Surface Recharge	$54 to 164,000,000	10-20 years	
-Direct Injection	$65,000,000	10-20 years	
Fish Habitat Enhancement			
-Yakima and Naches Rivers			
--Yakima River: Keechelus Dam to Roza Dam	$26,000,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Yakima River: Roza Dam to Prosser Dam	$20,400,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Yakima River: Prosser Dam to Columbia River	TBD	TBD	
--Naches River: Bumping Dam to Tieton River	$1,200,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Naches River: Tieton River to Yakima River	$11,400,000	TBD	Yakima Steelhead Recovery Plan, 2008
-Tributary Habitat Improvements			
--Big Creek	TBD	TBD	Yakima Steelhead Recovery Plan, 2008
--Cle Elum River	$150,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Teanaway River	$5,000,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Swauk Creek	$780,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Taneum Creek	$6,050,000	TBD	Yakima Steelhead Recovery Plan, 2008

Element	Estimated Construction Cost	Construction Duration	Source
--Jack Creek	$730,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Indian Creek	TBD	TBD	Yakima Steelhead Recovery Plan, 2008
--Cherry Creek	$30,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Manastash Creek	$4,890,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Reecer Creek	$1,970,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Naneum Creek	$30,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Coleman Creek	$30,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Bumping River	$1,890,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Cowiche Creek	$4,570,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Wide Hollow Creek	TBD	TBD	Yakima Steelhead Recovery Plan, 2008
--Toppenish Creek	$10,350,000	TBD	Yakima Steelhead Recovery Plan, 2008
--Satus Creek	$20,360,000	TBD	Yakima Steelhead Recovery Plan, 2008
Subtotal – Fish Habitat Enhancement	***$115,800,000-unknown***		
Enhanced Water Conservation			
	$405,000,000	10 years	
Market-Based Reallocation of Water Resources			
Drought years lease	$45,000,000	1 year	
Non-drought years purchase	Up to $173,000,000	20-50 years	
TOTAL – Integrated Water Resource Management Alternative	**$2,800,000,000**		

TBD = To be determined

The element with the least amount of information available on costs is the fish habitat enhancement element. Costs for habitat restoration projects were obtained from the Yakima Steelhead Recovery Plan (2008); however, the estimates appear to be very preliminary. Table 5-26 presents estimated costs for common items in fish habitat enhancement projects. When more detail is available on fish habitat enhancement projects, these types of unit costs would be applied to quantities estimated for each project to obtain an estimated construction cost. Additional costs such as design, permitting, and administrative costs would also need to be added; those costs can total up to 25 percent of the construction cost.

Table 5-36 Unit Costs for Common Items in Fish Habitat Enhancement Element

Item	Units	Unit Cost
Clearing and grubbing	Acre	$5,000
Coffer dams/fish exclusion at structures	Each	$10,000
Riprap and boulders	Ton	$50
LWD pieces placed in structures	Each	$800
Excavation	Cubic Yard	$4 to $12
Stream bed gravel	Cubic Yard	$10 to $25
Compost	Cubic Yard	$60
Seeding	Acre	$2,500
Bank stabilization	Linear Foot	$50 to $250
Channel connectivity	Linear Foot	$850
Log control weir	Each	$10,000
Plant removal/control	Acre	$4,000
Riparian restoration	Square Foot	$2

Additional analyses of all the elements will be prepared if the projects proceed to a feasibility-level study.

5.13.4.2 Lost and Gained Revenue from the Integrated Water Resource Management Alternative

Section 5.7.2.2 described the potential loss of hydroelectric generation that could occur under the modifying existing structures and facilities element, specifically the subordination of Roza Power Plant and Chandler Power Plant diversions during spring months (April-June). An estimate of the lost generation revenue was made using rate tables from BPA's 2007 Supplemental Wholesale Power Rate Case schedules (BPA, 2008). After comparing the monthly demand rates and monthly energy rates, a rate of 25 mills/kWh ($0.025/kWh) was selected to represent the amount of revenue lost from reduced hydroelectric generation for this document.

Table 5-37 lists the estimated amount of monthly revenue lost due to Roza Power Plant subordination, and Table 5-38 lists the estimated amount of monthly revenue lost due to Chandler Power Plant subordination for various amounts of flow left instream.

Table 5-37 Estimated Reduction in Annual Revenue Generated from Roza Power Plant

Increase in Yakima River Flow (cfs)	Reduction in Revenue Generated			
	April	May	June	Total
50	$9,000	$9,300	$9,000	$27,300
100	$18,000	$18,600	$18,000	$54,600
150	$27,000	$27,900	$27,000	$81,900
200	$36,000	$37,200	$36,000	$109,200
250	$45,000	$46,500	$45,000	$136,500
300	$54,000	$55,800	$54,000	$163,800

Table 5-38 Estimated Reduction in Annual Revenue Generated from Chandler Power Plant

New Minimum Flow below Prosser Dam (Apr-Jun) (cfs)	Reduction in Revenue Generated			
	April	May	June	Total
1,100	$1,600	$1,700	$2,700	$6,000
1,200	$3,300	$3,700	$3,900	$10,900
1,300	$4,200	$6,200	$5,100	$15,500
1,400	$4,700	$8,700	$6,500	$19,900
1,500	$5,300	$11,300	$8,400	$25,000
1,600	$6,300	$13,900	$10,400	$30,600
1,700	$7,500	$16,500	$12,300	$36,300
1,800	$8,700	$19,300	$14,200	$42,200
1,900	$10,300	$22,000	$15,900	$48,200
2,000	$12,300	$24,400	$17,700	$54,400

Note: Current minimum flow below Prosser Dam is 1,000 cfs for April to June time period.

If the Roza Power Plant is subordinated to increase Yakima River flow by 50 cfs in April and May, the loss in annual revenue from hydroelectric generation is estimated to be $18,300. If the flow is increased to 300 cfs from April to June, the loss in annual revenue is estimated to be $163,800.

An additional subordination will occur to fill Wymer Reservoir. The hydrologic modeling performed for the Integrated Water Resource Management Alternative showed an average of 15,790 cfs-days (379,000 cfs-hours) diverted by the Thorp pump station into Wymer Reservoir. However that water could be run through a power plant at Wymer Dam to recover the energy used to pump water at Thorp. In addition, the extra water made available through increased storage can be run through the Roza Power Plant. The hydrologic model estimated an additional 21,000 cfs-days (505,316 cfs-hours) will be run through the Roza Power Plant. The value of that hydroelectric generation is $126,000/year.

If the Chandler Power Plant is subordinated to increase the minimum flow level in the Yakima River below Prosser Dam from 1,000 cfs to 1,100 cfs in April to June, the loss in annual revenue from hydroelectric generation is estimated to be $6,000. If the minimum flow is increased to 2,000 cfs from April to June, the loss in annual revenue is estimated to be $54,400.

5.13.5 Mitigation Measures

The type of mitigation needed would be determined by future socioeconomic conditions and the specific steps that would be taken to implement the actions. Mitigation typically would be warranted only insofar as an action would reduce the supply of one set of goods and services (to increase the supply of another) and the reduction harmed one or more individuals, businesses, landowners, or other interest groups. For example, mitigation might involve compensation if the fallowing of land to develop new storage were to render a farmer unable to grow a certain crop. Alternatively, mitigation might involve the provision of substitutes for the reduced goods and services. Additional discussion of mitigation measures for potential socioeconomic impacts were described in Section 5.14.3 of the January 2008 Draft Planning Report/EIS.

5.14 Visual Resources

5.14.1 No Action Alternative

The No Action Alternative includes individual actions that could affect visual resources. Riparian habitat improvements, included in some of these actions, would have a beneficial impact on the visual resource settings. Other projects could also have visual resource impacts, but those impacts would be less obvious because they would associated with existing facilities. These projects would undergo separate NEPA or SEPA analysis, as appropriate. Because the projects would not be implemented as an integrated program, they have the potential to have greater impacts on visual resources.

5.14.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.14.2.1 Fish Passage Element

The proposed fish passage elements would be located in landscape settings where the overall visual character and scenic quality are high. However, the fish passage facilities would be located at existing dams where human activities have reduced the visual character and scenic quality. It is often more difficult to blend or design compatible facilities in such settings without creating a significant change in visual character or reducing scenic quality. The capacity to visually absorb development is primarily dependent on vegetation cover, landform, and existing structures.

Lake and reservoir shorelines generally have a low ability to visually absorb new development due to the availability of uninterrupted views across water (Reclamation, 2008c). However, a major factor influencing the potential visual impact is the level of visual contrast between the proposed new development and the existing elements in the landscape. The existence of Cle Elum, Bumping Lake, Rimrock, Keechelus, and

Kachess Dams, and their related structures, would make new visual intrusions related to implementing fish passage less apparent. Distance is also a strong influence on potential visual impact is reduced if the project is viewed from a distance.

At viewpoints above the dams, and on or adjacent to reservoirs, additional intake structures and conduits for fish passage may be visible. Typical viewpoints are from highways, local roads, shoreline campgrounds, and residences adjacent to or overlooking the reservoirs.

At viewpoints below dams, additional outlets for downstream fish passage and structures for upstream fish passage (barrier, fish ladder, loading slab, building, fish lock, and holding pool) would be visible. Typical viewpoints are from highways, local roads, and riverbanks, where public access exists. The views would generally be fleeting for motorists.

Many of the new and modified facilities would be visible from viewpoints, but would be subordinate in character to the dams. In some cases they would be indistinguishable; in other cases they would be more pronounced. Exterior surfaces would be designed to blend with the surrounding landscape. Reclamation has determined that for Cle Elum and Bumping Lake Dams, the upstream fish passage facilities will be indistinguishable from existing dam features (Reclamation, 2008c). At Cle Elum Dam, the downstream barrier may be visible from the riverbank and at Bumping Lake Dam, the top of the fish handling facility building may be visible from the adjacent Forest Road.

Removal of some second-growth conifer forest and riparian vegetation would be necessary to construct fish collection facilities at some dam sites, which would create a more open setting and potentially increase views into the sites. Development of access roads to new trap and haul facilities would also have the potential to increase views into the sites. For the most part, the new facilities would be introduced into a visual environment already containing several similar facilities, though some impacts would be locally significant.

5.14.2.2 Modifying Existing Structures and Facilities Element

The fish bypass systems and canal projects would result in smaller scale facilities, though similar types of visual impacts as described above for the fish passage element.

Operational changes at existing facilities would have minimal visual impact. Flows may be increased or decreased in individual reaches, but would be within the range of river levels. Structural changes to existing facilities would include improvements to the Wapato Irrigation Project, and changes to the Chandler juvenile fish bypass outfall. These changes would not cause visual impacts.

Options for modifying the KRD Main Canal and South Branch Canal could result in visual changes related to piping existing open ditches (laterals) and constructing a new pump station on the Yakima River near the tail end of the South Branch Canal. Given the open, agricultural and sparsely developed character of the landscape through which these pipelines would be routed, their long-term visual impact would be minimal. Depending on the selected location for the new pump station, the visual impact of the facility could be significant on a local scale (i.e., to existing residents in the immediate vicinity or to recreationists on the river).

Completing the Wapatox Project could result in visual changes at a local scale related to modifying the conveyance system or consolidating the Wapatox and Naches-Selah diversions, but would remain within the agricultural and sparsely developed character of the landscape.

5.14.2.3 New Storage Element

Construction of a new storage facility would result in significant long-term visual impacts to the area. The magnitude of the impact would depend on the proposed location of the facility, the existing character of the surrounding landscape, and the scale of the project. Areas inundated by the reservoir would be permanently removed from the visual landscape; downstream reaches of receiving waters would be altered where the flow regime is altered.

The Bumping Lake expansion would increase the current 1,300-acre reservoir to 4,120 acres under the large option, and 3,500 acres under the small option. The new dam structure under the large option would be 230 feet high, an almost four-fold increase in height over the existing dam. The new dam and expansion of Bumping Lake would significantly and irrevocably affect the visual character of the Bumping Lake valley.

The new dam and expanded reservoir would be visible from viewpoints surrounding the reservoir. Changes to the lake would be particularly evident along the east and southeast areas of the lake from Bumping Lake Dam, south to the Deep Creek drainage area. This area would be inundated and would change from a low-lying, forested upland lake fringe to open water. This change would be perceived as either neutral or positive by some and as adverse by others. The degree of positive versus negative viewer reaction would likely vary by perceived opportunity (e.g., access for various types of recreation and similar pursuits). The dam and expanded reservoir would be visible to trail users from a number of obstructed viewpoints (filtered views through trees) and unobstructed viewpoints in the William O. Douglas Wilderness Area. Viewpoints include trails and lookout points on American Ridge (north of the lake), Nelson’s Ridge (south of the lake), and Miner’s Ridge (west of the lake). Many of these trail users are in the Wilderness Area because they value natural settings, and they may view the new dam and expanded reservoir as negative.

Modification of river operations in conjunction with storage in the Naches River basin could include changes to canals and ditches in the KRD system, including the KRD Main Canal, North Branch Canal, and South Branch Canal. These changes may be visible from local roads, highways, recreational areas, and residences and could include new, combined or enlarged canals, ditches, siphons, and tunnels. While most of these changes would occur in the vicinity of existing systems, a new canal from Cle Elum Dam to the KRD Main Canal is also included.

One option for filling the proposed Wymer reservoir would require 46 miles of pipeline between Cle Elum Dam and Wymer Dam. With the exception of some above-ground easement appurtenance facilities, this alternative is composed entirely of underground pipelines; the only surface manifestation would be a managed corridor of land along the easement or right-of-way. Management of the corridor would include prohibition of permanent structures, but landscape plantings, agriculture in some form, and/or restored natural vegetation (as appropriate to the environment along the route) would characterize the corridor after construction. Given the open, agricultural, and sparsely developed character of the landscape through which these pipelines would be routed, their long-term visual impact would be minimal.

Pine Hollow reservoir was included in Ecology's Final Programmatic EIS on the Ahtanum Creek Watershed Restoration Program (Ecology, 2005). As described in the EIS, construction of the Pine Hollow reservoir would alter the appearance of the Pine Hollow area. A portion of the grassy, rocky canyon area would be converted to a reservoir with an earthen dam at the western end. The dam would block views from the surrounding ridges down Pine Hollow. When full, the reservoir would resemble a lake that would contrast with the surrounding arid area. Filling and drawing down the reservoir would result in white mineral deposits ("bathtub ring") and exposed mud flats during drawdowns, which would be visible to residents in the Pine Hollow area until the reservoir is refilled in late winter/early spring. The appearance of the Johncox Ditch area would also be altered by the reservoir.

5.14.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on visual resources were described in Section 5.19.2.3 of the January 2008 Draft Planning Report/EIS.

5.14.2.5 Fish Habitat Enhancement Element

Habitat enhancements, including levee setbacks and riparian plantings, would improve the condition of riparian vegetation and change views of the rivers and creeks. These enhancements would create a more natural visual setting, which would generally be viewed as positive.

5.14.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on visual resources were described in Section 5.19.2.1 of the January 2008 Draft Planning Report/EIS.

5.14.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on visual resources were described in Section 5.19.2.2 of the January 2008 Draft Planning Report/EIS.

5.14.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

Because the visual impacts of the facilities would be primarily of local scale, no increase or lessening of impacts as a result of the integrated elements is expected. Further, considering the similarity in appearance with existing structures and the fact that the overall complex of facilities at individual project sites would be viewed predominately from a distance, the overall long-term visual resource impact is not expected to be significant.

5.14.4 Mitigation Measures

Disturbed areas below the fish passage facilities would be contoured to blend with adjacent areas to the extent practicable and revegetated with appropriate native plant species. The old-growth western red cedar stand and mature conifers in the area located downstream of Bumping Lake Dam would be protected from disturbance to the extent possible. The visual impacts of fish handling facilities would be reduced using the appropriate paint color to blend with the natural landscape.

New or modified canals, ditches, tunnels, siphons, and appurtenant facilities would be located to minimize their visibility from public areas.

Consultation with the landscape architect for the Okanogan-Wenatchee National Forest in advance of preparing designs will assure the fish passage facilities, storage elements, and restoration of lands disturbed during construction within U.S. Forest Service property will meet the High Scenic Integrity Level (Retention VQO) as much as possible given engineering requirements.

Additional mitigation measures for potential impacts to visual resources were described in Section 5.19.3 of the January 2008 Draft Planning Report/EIS.

5.15 Transportation

5.15.1 No Action Alternative

Long-term transportation associated with the No Action Alternative would be similar to those described in Sections 4.16 and 5.17 of the January 2008 Draft Planning Report/EIS.

5.15.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements

5.15.2.1 Fish Passage Element

No long-term impacts to transportation are anticipated. The operational requirements of some fish passage projects would require infrequent trips by maintenance vehicles and would have no impact on transportation systems. Adult fish would be hauled past dams in trucks on service roads. The hauling operations would last a few weeks each year and would not impact transportation.

5.15.2.2 Modifying Existing Structures and Facilities Element

No long-term impacts to transportation are anticipated from proposed structural modifications. The operational requirements of some canal, pipe, or pump station projects would require infrequent trips by maintenance vehicles and would have no impact on transportation systems.

5.15.2.3 New Storage Element

The proposed Bumping Lake expansion would eliminate some lakeshore access and associated facilities (e.g., boat launches and parking), and access roads that provide access to recreational sites and facilities. Access roads that would be inundated include National Forest Development Roads 1800 (from a location south of the Bumping Crossing Campground), 1808, 1809, and 1810. These roads provide access to several trailheads and recreational sites, including Deep Creek Trailhead, Fish Lake Way Trailhead, Swamp Lake Trailhead, Lily Lake Trailhead, Granite Lake, and Copper City, an old mining area.

No public road or rail facilities would be closed or relocated as a result of the proposed new storage projects. The operational requirements of new storage projects would require infrequent trips by maintenance vehicles and would have no impact on transportation systems. New access roads could be required to access new storage facilities. Those roads would be maintained by the operating entity of the reservoir. Expansion of Bumping Lake would limit the ability of the U.S. Forest Service to construct new access roads to trailheads that access the William O. Douglas Wilderness Area.

The impacts to transportation resources from the proposed expansion of Bumping Lake were further analyzed in the Proposed Bumping Lake Enlargement Final EIS prepared by Reclamation (Reclamation, 1979). The impacts to recreational sites and facilities are described in Section 5.10.2.3.

5.15.2.4 Ground Water Storage Element

The impacts of the Ground Water Storage Element on transportation were described in Section 5.16.2.3 of the January 2008 Draft Planning Report/EIS.

5.15.2.5 Fish Habitat Enhancement Element

No long-term impacts to transportation are anticipated. The operational requirements of some fish habitat enhancement projects may require infrequent trips by maintenance vehicles and would have no impact on transportation systems.

5.15.2.6 Enhanced Water Conservation Element

The impacts of the Enhanced Water Conservation Element on transportation were described in Section 5.16.2.1 of the January 2008 Draft Planning Report/EIS.

5.15.2.7 Market-based Reallocation of Water Resources Element

The impacts of the Market-based Reallocation of Water Resources Element on transportation were described in Section 5.16.2.2 of the January 2008 Draft Planning Report/EIS.

5.15.3 Integrated Water Resource Management Alternative—Impacts of Integrated Elements

No long-term impacts to transportation are anticipated beyond those that would occur if the elements were implemented individually.

5.15.4 Mitigation Measures

Since there would be no long-term impacts to transportation, no mitigation is necessary.

5.16 Cumulative Impacts

The overall cumulative impacts of the Integrated Water Resource Management Alternative are expected to be beneficial, although some localized impacts could occur associated with individual projects. The integrated approach to resolving water resource problems in the Yakima River basin is proposed to provide greater benefits than implementing any one project element alone. A combined package of fish passage, water storage, and habitat enhancement is expected to provide greater benefits to resident and anadromous fish than any one of those elements would individually. Water storage and modifications to existing facilities and operations are expected to provide greater benefits to irrigation and municipal water supply. Integrating improvements to fish habitat and water supply improves the potential for implementing those improvements.

Individual elements of the Integrated Water Resource Management Alternative could cause cumulative impacts when combined with other past, present, and reasonably foreseeable future actions. Building new water storage facilities or expanding existing reservoirs would add to existing impacts in a river basin that has already been extensively dammed. Additional storage facilities could exacerbate the impacts of existing facilities. For example, on-channel storage could add additional impediments to fish passage, increase migration times, and affect downstream water quality. However, any new facility constructed as part of the Integrated Water Resource Management Alternative would include fish passage and fish passage would be installed at existing reservoirs as part of the package. New or expanded reservoirs could inundate terrestrial wildlife habitat and impact plant or wildlife species already in decline.

The Integrated Water Resource Management Alternative is not intended to expand irrigation in the Yakima River basin. However, it would provide a more reliable water supply for prorationed users which could encourage farmers to shift to more permanent crops. These changes in agriculture are not expected to add to the decline in shrub-steppe habitat or other important habitat in the basin.

The proposed Integrated Water Resource Management Alternative is intended to have incremental benefits to fish species, including those that are listed as threatened and endangered. Providing fish passage at the reservoirs and enhancing habitat on the rivers and tributaries in the basin would help reverse environmental damage from the early 1900s. These improvements, combined with improved stream flows, would benefit resident and anadromous in the Yakima River basin and reduce the risks of further decline.

This EIS is the first step in phased review of an Integrated Water Resource Management Alternative. The development of an integrated approach is itself an effort to evaluate and manage water resources on a system-wide basis. This system-wide approach will help to identify impacts at a comprehensive level thus reducing the potential for unintended cumulative impacts. Potential impacts of specific projects that are identified as part of the Integrated Water Resource Management Alternative will undergo additional project-level review when they are identified. The project-level review will identify specific project impacts and ways to avoid or mitigate those impacts. To avoid potential cumulative impacts of the Integrated Water Resource Management Alternative, Ecology will continue to coordinate with the Yakama Nation and local, state, and federal agencies that manage resources in the Yakima River basin.

CHAPTER 6.0 COMMENTS AND RESPONSES

This chapter includes comments and responses submitted on two documents—the January 2008 Draft Planning Report/EIS and the December 2008 Supplemental Draft EIS. Reclamation and Ecology prepared a joint NEPA/SEPA Draft Planning Report/EIS on the Yakima River Basin Water Storage Feasibility Study in January 2008. In response to comments on that document, Ecology decided to prepare a separate SEPA Supplemental Draft EIS to evaluate a broader range of alternatives than Reclamation believed was allowed under its congressional authority. Ecology released the Supplemental Draft EIS December 10, 2008.

Reclamation and Ecology held a public comment period on the January 2008 Draft Planning Report/EIS from January 28 to March 31, 2008. The public comment period on the Supplemental Draft EIS was held from December 10, 2008 to January 16, 2009.

The majority of comments on the January 2008 Draft Planning Report/EIS were responded to by Reclamation in its December 2008 Final Planning Report/EIS. Those comments relevant to the State Alternatives are reproduced and responded to in this chapter starting on page 5.

For the December 2008 Supplemental Draft EIS, all of the written comments are reproduced and included in this chapter of the Final EIS starting on page 63. Ecology received several comments regarding the programmatic nature of the December 2008 Supplemental Draft EIS. Ecology prepared a Master Response to those comments beginning on page 3 of this chapter. This Master Responses is referred to in the comment responses.

To save space, the comment letters have been reduced to allow two pages to be reproduced on one page. Responses to each comment letter follow the reproduced letter.

JANUARY 2008 DRAFT PLANNING REPORT/EIS

LIST OF COMMENTERS

Comment Letter	Commenter
1	Confederated Tribes of the Yakama Nation and Roza Irrigation District – Ralph Sampson, Jr., and Ric Valicoff
2	Confederated Tribes of the Yakama Nation – Ralph Sampson, Jr.
3	Washington Department of Fish and Wildlife – Jeff Tayer
4	Western Watersheds Program – Katie Fite
5	American Rivers – Michael Garrity
6	Center for Environmental Law and Policy – Rachael Osborn
7	Yakima Valley Storage Alliance – Charlie de la Chappelle
8	Public Hearing Comments

DECEMBER 2008 SUPPLEMENTAL DRAFT EIS

LIST OF COMMENTERS

Comment Letter	Commenter
1	Yakama Indian Nation, Phil Rigdon (unsigned version)
2	Bureau of Indian Affairs, Northwest Regional Director (can't read signature)
3	U.S. Bureau of Reclamation (unsigned draft)
4	Washington Department of Fish and Wildlife Jeff Tayer
5	Yakima Regional Clean Air Agency
6	Yakima County Board of Commissioners
7	Benton County Board of Commissioners, Max Benitz
8	Kittitas Reclamation District, Roger Satnik
9	Yakima Basin Storage Alliance, Sid Morrison
10	Yakima Basin Fish and Wildlife Recovery Board, Alex Conley
11	American Rivers, Michael Garrity
12	Center for Environmental Law and Policy, John Osborn
13	Wise Use Movement, John de Yonge
14	Sierra Club Cascade Chapter, Michael O'Brien
15	National Wildlife Federation, Steven Malloch
16	Larry Vinsonhaler
17	Jennifer Hackett
18	Margie Van Cleve
19	Joseph Lawatchie, Sr.
20	Karen Pilon
21	Tom Carpenter
22	Charles Klarich
23	Walter Kloefkorn
24	Laura Hendricks, Coalition to Protect Puget Sound Habitat
25	Nick Grayeski, Wild Fish Conservancy
26	Paul Andrews
27	Frank I. Backus
28	Janine Blaeloch, Western Lands Project
29	T. Doan
30	Michael Ewald
31	Shaun McHenry
32	Bill McMillan
33	Stan Moffet
34	Bobbie Morgan
35	Anne Mosness
36	Donald Potter
37	K. Russel
38	Fred Struck
39	Meghan Tierney-Knight

40	John Townsell
41	Wayne Ude
42	Ken Weeks
43	Emily Crandall
44	Steve Zemke
45	Email message submitted by the following 27 individuals Ellie Belew brooke@raincity.com Robin Dean Jim Eberhardt Karen H. Edwards Connie Fukudome David Gordon Jason Hardy Wade Higgins Anne Johnson Mary Kunkel Dianna Larson Carl Lind Alerian Lockwood Rhonda Murphy Judy Noll Elaine Packard Robert Pauw Gibbs Houston Pauw Tom Putnam Dick Rieman Greta M. Rizzuti Nancy Rust W. Thomas Soeldner Devin Smith Alan H. Taylor Julie Titone

MASTER RESPONSE TO PROGRAMMATIC EIS COMMENTS

ISSUE: Numerous comments stated that the Supplemental Draft EIS analysis did not contain enough details to evaluate potential impacts. Comments also stated that the alternatives were not adequately developed to allow for adequate analysis.

RESPONSE: In accordance with the State Environmental Policy Act Rules (Chapter 197-11 WAC), Ecology has assessed the environmental impacts associated with implementation of an Integrated Water Resource Management Alternative for the Yakima River basin using a "broad to narrow" approach. This approach is referred to as phased review, and is appropriately used to assist "agencies and the public to focus on issues that are ready for decision and exclude from consideration issues already decided or not yet ready." The Programmatic Environmental Impact Statement (EIS) evaluates the elements of the Integrated Water Resource Management Alternative. These elements include fish passage, modifying existing structures and operations, new storage, fish habitat enhancement, enhanced conservation, market-based reallocation of water resources, and ground water storage. This EIS evaluates impacts associated with those elements and acknowledges that additional, more detailed analysis will be conducted as specific projects are identified.

WAC 197-11-055 (2) notes that "The lead agency shall prepare its threshold determination and environmental impact statement (EIS), if required, at the earliest possible point in the planning and decision-making process, when the principal features of a proposal and its environmental impacts can be reasonably identified." Consistent with this guidance, Ecology has prepared its EIS at a time when the principal elements have been identified and the effects of implementation can be reasonably identified. However, many specific projects associated with the Integrated Water Resource Management Alternative are not yet identified, and only limited information is available for some of the projects that have been identified.

EISs may be "phased" in appropriate situations (WAC 197-11-060 (5)). WAC 197-11-060(5)(a) states that "Lead agencies shall determine the appropriate scope and level of detail of environmental review to coincide with meaningful points in their planning and decision making processes." WAC 197-11-060(5)(g) states "Any phased review shall be logical in relation to the design of the overall system or network…"

Ecology has conducted the phased review of the Integrated Water Resource Management Alternative consistent with WAC 197-11-060(5). At this time, broad policy concepts have been developed; these concepts will be further refined as Ecology enters into implementation of the specific elements of the program. The purpose of this Programmatic EIS is to frame or "bracket" the potential range of impacts, so that the broad implications and tradeoffs associated with implementing the program can be understood. Accordingly, the impact evaluation is based on currently available information and published reports, and does not include extensive site-specific investigations, which are more appropriately conducted during project or construction level evaluations. Similarly, mitigation measures are broadly framed to give an understanding of the potential range and effectiveness of mitigation. Site specific investigations will include development of specific mitigation measures that fall within the general categories of mitigation discussed in this document.

The Programmatic EIS acknowledges that additional site-specific SEPA evaluation and in some cases NEPA documentation will be conducted as part of specific project evaluations. These evaluations would be appropriately characterized as "narrow" in accordance with WAC 197-11-060(5). Any additional or cumulative impacts associated with those facilities that have not currently been identified will be comprehensively discussed as part of those subsequent documents.

Comment TRB-0002

Received in Mailroom
APR 0 3 2008
Yakima, Washington

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

March 31, 2008

Derek I. Sandison, Regional Director
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Re: Joint Yakama Nation, Roza Irrigation District comments on Yakima Basin Storage Study

Dear Sirs,

Ecology's Comment Response Numbers in this Document

Reclamation's Planning Report/ EIS Comment Responses

1 **01** The Yakama Nation and Roza Irrigation District appreciate the opportunity to submit this joint letter on the Yakima Basin Storage Study EIS. The Nation and Roza hold two of the largest proratable irrigation rights in the Yakima Basin. The Yakama Nation, in addition, holds Time Immemorial Treaty Rights for water to maintain the fishery that has supported the economy, diet and culture of the Yakama People for thousands of years. We both feel that the only solution to the problems in the Yakima basin is one that benefits all resources collectively, Indian, non-Indian, instream and out. Achieving these goals will require using all the available tools, including restoration of fish passage, additional storage, further conservation, water markets, habitat restoration and others. It now seems clear that an overly restrictive congressional authorization for the storage study has precluded assembling an appropriate package of measures. It is quite clear that storage alone can not solve the range of problems facing the resources. We believe the

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Ecology's Comment Response Numbers in this Document

Storage Study, for reasons we understand, has failed develop and evaluate the kind of package necessary to solve the water resource problems in the basin. It is our hope that this letter will point the direction toward what we consider to be the elements of a consensus solution to the problems facing the fishery and agricultural resources of the Yakima River basin.

Reclamation's Planning Report/ EIS Comment Responses

2 The Yakama Nation will provide detailed comments on the content of the EIS and associated technical reports in a separate letter. This letter does not constitute a legal position or admission by either the Yakama Nation or the Roza Irrigation District nor waive, limit or concede any argument otherwise available to either.

3 **02** Given that any mutually acceptable solution to the resource problems of the basin will require a package of measures, it is impractical to analyze the potential benefits of storage alone, as has been done in the Storage Study. Effective fish utilization of any improved flow regime depends on a concomitant enhancement of habitat access and quality in the mainstem and tributaries. Failure to consider all components of the package together artificially inflates the relative value of some storage alternatives while underestimating the value of flow enhancement in general. For example, flow improvements in key mainstem reaches considered in tandem with reintroduction of anadromous fish above the reservoirs and in tributaries along with restoration of mainstem floodplain side channels would likely yield much greater benefits than flow improvements alone. Further analysis should be done of the cumulative benefits of upper mainstem, Naches arm, and tributary instream flow modifications resulting from storage, conservation, and acquisition alternatives in tandem with restoration of passage at the Yakima Project reservoirs, restoration of flow and passage in the tributaries, and reconnection of the river and its floodplains.

4 **03** We believe as a matter of both principal and practical considerations that the least cost long-term solutions should be identified and evaluated. In addition to considering such low-cost alternatives as water marketing, highest benefit per cost storage options need to be exhaustively identified. Whatever storage component may be eventually selected as part of a package, it is important that it be as economical to build and operate as possible, lest the storage component compete unnecessarily for funding with ongoing successful salmon recovery and enhancement projects and place an unnecessary burden on agriculture. **04** The 70% criteria for proratable supply may be a useful planning goal, but is not appropriately used on the storage study to eliminate more modest proposals.

5 **05** We believe that the storage study has inadvisably removed from consideration options for storing Yakima River flows, particularly in the Naches Arm. Gravity storage and release will always be less expensive both in capital and operating costs than pump storage. Likewise, for pump storage, lower pumping heads equate to lower initial and ongoing costs. We suggest a thorough analysis of both water budget and potential storage sites for Naches arm water.

6 We suggest the equivalent water budget analysis be performed for the Naches arm as has been done for the mainstem in the Wymer and Black Rock analysis. It appears that the

2

Ecology's Comment Response Numbers in this Document

Reclamation's Planning Report/ EIS Comment Responses

05

6 Bumping alternative was thrown out based on a simplistic and inappropriate consideration of "normative" flows, while other alternatives received a rigorous study relating flow with habitat, temperature and other parameters. The Bumping review seems to have assumed that any deviation from current measured flow in unregulated reaches would be non-normative. One problem is a variety of inconsistent and imprecise definitions of the term normative. The manner in which the normative flow concept was applied did not lend itself to evaluating small changes in operations, water transfers, timing of changes in flow, or smaller storage options. Normative and natural are not synonymous. Normative is a concept encompassing functions performed by the hydrograph and is determined by the sort of study being done on the other storage study alternatives. Reducing peak flows and increasing summer flows may or may not be less normative. Study is required to make that determination.

Also, it can not be assumed that the existing observed flows in the unregulated reaches of the Naches arm are either natural or normative. Land use practices such as logging and road building, which are extensive in parts of the Naches arm, tend to increase peak flows and decrease summer flows. Climate change is predicted to further shift the hydrograph toward earlier higher peaks and lower summer flows. Flows in the Naches below the confluence with the Tieton are already artificially low, except during flip flop, due to the influence of Rimrock. Summer restoration of higher flows in the lower Naches would be beneficial, which was the justification for the acquisition of Wapatox, which was a partial fix for the problem.

For the above reasons, we believe the analysis of Bumping, and by extension any other storage opportunities on the Naches arm inappropriately eliminated consideration of options for storing water generated in the only large part of the basin where additional Yakima River water may potentially be stored for the benefit of both instream and out of stream resources.

7 One final and fatal flaw in the Bumping analysis was the assumption that all newly stored water would be subject to the same operational constraints as the existing storage. The Yakama Nation has not agreed with these existing operational constraints and has, additionally, long made it clear that an agreed upon portion of any newly stored water would have to be managed by the Yakama Nation as part of its Treaty Right for instream flow for fish and other aquatic life. The Bumping analysis assumed all water would be managed to maximize carry over and any fish benefits would be coincidental. Given that the Yakama Nation would not support new storage under such conditions, this analysis was not fruitful. Bumping was not properly analyzed as a facility for the combined purposes of carry over storage as insurance against dry years along with instream flow and reducing the impacts of flip flop. Wymer should have been evaluated in combination with Bumping or other storage of Naches arm water to provide relief from flip flop operations.

06

8 The M&I analysis did not provide clarity. The goal is not well defined and appears to ignore the fact that most urban development is occurring in existing irrigated areas, which

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Ecology's Comment Response Numbers in this Document

Reclamation's Planning Report/ EIS Comment Responses

8 should greatly lessen future water needs. An adequate analysis of M&I alternatives was not performed.

07

9 In summary, the congressional emphasis on Black Rock seems to have required the Storage Study to be conducted in reverse. An analysis of the problems, needs, and issues, utilizing local expertise, should precede evaluating specific projects. Through its scoping comments, the Yakama Nation intended to provide the basis for this discussion of problems and needs. We incorporate those scoping comments by reference. However, scoping seems to have come too late in the process to have much influence on the direction of the study.

08

10 We recommend that Ecology and Reclamation work with Roza, the Yakama Nation, and others with interest and expertise in water and fisheries management to construct a package of measures to solve problems of flow, passage, and habitat in the Yakima basin. We are available to discuss this matter further at your convenience.

Sincerely,

Ralph Sampson Jr.

Ralph Sampson, Jr., Chairman
Yakama Tribal Council

Ric Valicoff

Ric Valicoff, Chairman
Roza Irrigation District Board of Directors

4

Comment Letter TRB-0002 – Confederated Tribes of the Yakama Nation and the Roza Irrigation District – Ralph Sampson, Jr. and Ric Valicoff

1	Comment noted. See additional responses below.
2	The Yakama Nation's detailed comments were received. Reclamation responded to the majority of those comments in the December 2008 Final Planning Report/EIS. Ecology is responding to Comments 67, 68, 69, and 72 in this document. See the responses to Comment Letter No. 2 below.
3	In response to this comment letter and other comments on the January 2008 Draft Planning Report/EIS, Ecology consulted with Reclamation concerning whether additional alternatives such as fish passage and habitat restoration should be evaluated. Reclamation concluded, as you note in your Comment Number 1, that its congressional authorization precluded it from expanding its analysis under NEPA. Ecology decided to separate from the joint NEPA/SEPA process and evaluate additional alternatives under a separate SEPA Supplemental Draft EIS. The December 2008 Supplemental Draft EIS presents an alternative that includes elements for fish passage, habitat enhancement, storage, and modifications to existing structures and operations. This alternative was presented as the Integrated Water Resource Management Alternative in Chapter 2 of the December 2008 Supplemental Draft EIS. Those elements were further evaluated and combined with the State Alternatives presented in the January 2008 Draft Planning Report/EIS—enhanced water conservation, market-based reallocation of water resources, and ground water storage—as part of the Integrated Water Resource Management Alternative presented in Chapter 2 of this document. The elements of the alternative have been evaluated as an integrated package.
4	The December 2009 Supplemental Draft EIS and this document have evaluated smaller-scale storage options, as well as modifications to existing facilities. Ecology has not used the 70 percent criteria for proratable water supply to evaluate storage options. Additional studies will be required to identify the storage element that presents the least cost long-term solution to water resource issues in the Yakima River basin.
5	The December 2009 Supplemental Draft EIS and this document evaluated storage options in the Naches River basin and gravity fill options for Wymer reservoir. This Final EIS used Reclamation's RiverWare model to conduct a preliminary water budget for potential storage sites. The results are presented in Section 5.3.
6	Your comments regarding normative flow are noted. The modeling done for the December 2009 Supplemental Draft EIS and this document did not use normative flows as evaluation criteria for expanding Bumping Lake or other storage projects. Ecology used Reclamation's RiverWare model with streamflows recommended by representatives from Reclamation, the Yakama Nation, and basin fish managers.
7	The evaluation of storage options in the December 2009 Supplemental Draft EIS and this document did not assume that existing operational constraints would be applied to new storage. It was assumed that additional water from the Bumping Lake expansion would be used to provide irrigation water during drought years only and to provide more flexibility in the operation of other Yakima Project reservoirs (Section 2.3.4.1 of this Final EIS). As noted in Section 5.3.2.3 of this Final EIS, the specific uses for additional storage water would be determined by a management team consisting of representatives from

	Reclamation, the Yakama Nation, major irrigators, and fish agencies.
8	Comment noted. Ecology agrees that the analysis of municipal use did not provide clarity. This Final EIS does not include any additional analysis of municipal use; however, Ecology anticipates that such an analysis could be conducted as part of Integrated Water Resource Management implementation plan.
9	Comment noted. Your scoping comments were considered in the development of the Integrated Water Resource Management Alternative.
10	Ecology worked with the Yakama Nation, Roza Irrigation District, Reclamation, and other water and fish interests in the Yakima River basin to develop the Integrated Water Resource Management Alternative presented in the December 2008 Supplemental Draft EIS and this Final EIS. Ecology plans to work with these interests to further refine the elements of an integrated package for improving water and fish conditions in the basin and to develop a funding proposal for that package.

Comment TRB-0001

Received in Mailroom
UCAO APR 03 2008 YFO
Yakima, Washington

Confederated Tribes and Bands of the Yakama Nation

Established by the Treaty of June 9, 1855

March 31, 2008

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Re: Yakama Nation comments on Yakima Basin Storage Study EIS

Dear Sirs,

We are submitting the following comments on the EIS for the Yakima Basin Storage Study prepared by Yakama Nation staff. These predominantly technical comments are submitted in addition to the joint comment letter submitted with the Roza Irrigation District. While these comments are required by March 31st we will continue to produce and submit technical reports and reviews under the terms of our agreement with Reclamation. We plan to take particular interest in some alternatives that received unduly little attention in the Storage Study EIS. We will continue to be active in seeking solutions to the basin's problems in keeping with our instream and out of stream Treaty water rights.

The technical comments contain several references to further technical work that would need to be done in order to determine the safety and suitability of the Black Reservoir site. Please note that we are not recommending that those additional studies be undertaken at this time. We

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recommend instead the problem solving approach for proceeding outlined in the joint comment letter.

This document does not constitute a legal position or admission by the Yakama Nation or waive, limit, or concede any argument otherwise available to us. The Yakama Nation reserves all rights and remedies available to it to protect its Treaty Rights and resources.

We look forward to working with Ecology, Reclamation, and other parties in developing a package of solutions to the problems facing the Yakama basin and its resources.

Sincerely,

Ralph Sampson Jr.

Ralph Sampson, Jr., Chairman
Yakama Tribal Council

Reclamation's Planning Report/ EIS Comment Responses

Comments on Cultural Resources

General Concerns

01 The areas of potential effect lie within the ceded area of the Confederated Tribes and Bands of the Yakama Nation as set forth in the Treaty of 1855 (12 stat., 951) between the Yakama Nation and the United States government. With this document, the Yakama Nation asserts sole tribal authority in matters pertaining to the management of their cultural resources within this area. 02 Management includes determination of significance of impacts to traditional cultural properties, archaeological, sacred religious, hunting, gathering, ancestral, legendary, 03 historical sites etc. 04 Only the Yakama Nation can determine what is significant to Yakama culture.

05 However, the overall cultural resource sections are missing a key tribal perspective on present traditional cultural properties, archaeological, sacred sites, food gathering and hunting areas, critical to traditional cultural practices of present day Yakamas. The only resource inventoried in the Cultural Resources report, provided by Archaeological Investigations Northwest (AINW), is historical resources and is mirrored in the language of the Draft/EIS. The

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Reclamation's Planning Report/ EIS Comment Responses

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Moreover, the author exaggerates the influence of an east to west trend in intertribal trade after the appearance of the horse. Plateau groups were part of a very complex and diverse trade web stretching into other culture areas besides those to the east. Just as the authors emphasize this east to west trend, items of great value moved from the Plateau to the east, as well. The Dentalium, for example, originates from the Northwest Coast. For some Plateau tribes, this shell was used as money and traded with Plains tribes who valued it as much as their western neighbors. Tribes, such as the Lakota, adorned themselves with the valuable shell on clothing and accessories (Would this not be an adoption of Plateau clothing styles?). The horse did much to change the lifestyles of the Yakama and related groups. Combined with aforementioned political and environmental factors, the changes that took place, on the Columbia Plateau before, during, and after their appearance, are complex far beyond the nine lines provided by the authors.

Plateau social organization has been widely studied in anthropology. Of those studies, Ackerman points out that Plateau social organization, in terms of gender roles, is defined as the equal or balanced access of men and women to power, authority, and autonomy in four social spheres" — economic, domestic, political, and religious" (Ackerman 2003: 24). Meanwhile, in terms of political organization, Walker describes that the role of "head men", which were typically chosen based on "qualities of wisdom, personal character, and leadership", existed on a village level. Chiefs, on the other hand, were associated with larger bands or tribal organizations (1998:336). Traditionally, chiefs do and did exist, especially in terms of regulating such activities as fishing and hunting.

4.20.2.4 Mitigation

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How would adverse impacts to cultural sites eligible for the NRHP under criteria other than D be mitigated for? If a site is eligible in terms of an association with an important event in tribal history (Criterion A) or a figure/individual significant to the tribe (flesh and blood or otherwise), what action(s) would mitigate the destruction of that site or place? As it is unlikely that mitigation could be pursued via archaeological data recovery for a site that is not deemed as National Register eligible in terms of its archaeological data potential, but rather for its cultural association or meaning, mitigation to the effected tribe would likely be in monetary terms.

13

Consultation with effected tribes in terms of NRHP eligibility would not be an option, but rather mandatory due to the potential for sites to be eligible to the National Register under

5

Reclamation's Planning Report/ EIS Comment Responses

Criteria other than D. This is not referring to TCPs, but rather eligibility outside the viewpoint of archaeology and archaeological data potential (Criterion D).

14

Consultation with effected tribes during the development of an MOA for mitigation measures would also not be optional. Reclamation, SHPO, or the ACHP would be poorly equipped to define either the damages or appropriate mitigation for sites eligible to the NRHP in terms of tribal cultural values and viewpoints. Further, development of an mitigation MOA is likely to be viewed as the creation of Reclamation policy, which would therefore be subject to Executive Order 13175 which requires regular and meaningful consultation and collaboration with Native American governments.

4.20.2.5 Cumulative Impacts

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This section makes reference to "historic resources", the non-renewable nature of these resources, the goal of archeological investigations being able to re-create a site or historic property in the laboratory, and the desirability of preserving a portion of a site for future analytical methods which might be able to extract additional archaeological data from a site. Although it does not state it specifically, the title of this section would imply that this would be the way to address the cumulative impacts of the chosen alternative. This further implies "historic resources" and the cumulative impacts upon them will only be addressed in terms of archaeology and archaeological data recovery. This extremely limited view of historic resources is a complete failure as far as meeting the intent of the NHPA, which does not define history or what is thought to be an historic resource solely in terms of archaeology or archaeological data. In terms of the NHPA, what is considered an historic resource, its importance or National Register eligibility, and whether it maintains its integrity, is defined by the people who consider it important. Therefore, how cumulative impacts are addressed cannot be done only through archaeological means and still maintain compliance with NHPA Section 106.

4.22 Indian Trust Assets

16

Under both the Wymer and Black Rock Alternatives, the flooding of the respective reservoirs would at minimum lead to significant loss of terrestrial resources. Although the Yakama Nation rights to these resources defined by the Treaty of 1855 would not be altered, if

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Reclamation's Planning Report/ EIS Comment Responses

the resources themselves were eliminated, then the right to utilize them becomes irrelevant. Therefore, the destruction of resources would ultimately and equally diminish the rights of the Yakama Nation to those resources. 16

Comments on Black Rock Alternative Hydrogeologic Technical Documents

There was too little time to review the complete set of technical documents provided by the Bureau of Reclamation regarding the proposed Black Rock dam and reservoir, therefore, some of the following statements and questions may have been addressed in some of the documents not reviewed or only briefly evaluated. The following discussions are based upon information presented in the following documents;

–Draft environmental planning report/impact statement, January 2008;
–TS-YSS-5, Dec 2004;
–TS-YSS-19, Sept 2007;
–Spane, 2004;
–Spane, 2007; and
–Columbia Geotechnical Associates, Feb 2004.

The evaluation of the available technical presented in four Sections, 1. Summary, 2. General Comments, 3. Specific Comments and 4. Future Studies.

1. Summary

1.1 Insufficient technical data is provided by the Bureau of Reclamation regarding the hydrogeology of the Black Rock dam and reservoir sites to allow a conclusive evaluation of the suitability of the sites for dam and reservoir construction at this time. Additional hydrologic tests would be required if the Black Rock alternative were to receive further consideration including "long term," on the order of weeks, controlled pumping tests designed to evaluate the areal hydrogeologic properties of the sedimentary valley fill and basalt aquifer systems, including transmissivity, storativity and vertical leakage. 17

1.2 A rigorous hydrogeologic testing program would need to be undertaken if the hydrologic suitability of the Black Rock dam and reservoir is to be proven. Hydrogeologic studies reported upon in the referenced technical documents were preliminary in nature, conducting reconnaissance geologic investigation, and short duration low stress hydrologic tests. The referenced studies did not provide the information required to design and/or evaluate the potential effects of a $4.5 billion dam construction and operation project. There is insufficient data currently available to evaluate the potential effects of reservoir leakage upon underlying groundwater flow systems, dam safety and issues regarding contamination present at the Hanford

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Reclamation's Planning Report/ EIS Comment Responses

site. There would be a need for additional information before Yakama Nation staff could make a recommendation regarding the hydrogeologic suitability of the proposed Black Rock dam and reservoir. Some potential studies directed toward providing the additional information that would be required are discussed in Section 4. 17

1.3 There should be no destruction of aquatic habitat allowed associated with constructing a dam, a partial purpose of which is to, improve aquatic habitat. In particular, the mining of aggregate from the floodplains of the Yakima and Columbia Rivers should not be further considered to provide source material for a dam or associated facilities 18

1.5 There are questions, posed in Section 3.1 of this email, regarding the realism of the groundwater computer model presented in document TS-YSS-19. These questions would need to be answered prior to using the outputs of the groundwater model in a technical evaluation of the possible impacts of constructing the proposed Black Rock dam and reservoir. Additionally TS-YSS-19 states "the model results contain a significant amount of uncertainty due to the limited availability of site hydrogeologic data (p. 1)," "the scope of the Black Rock computer model development and application is limited (p. 3)," "gathering new hydrologic data in the Dry Creek drainage could change the seepage rates that are presented (p. 79)," and "limited hydrologic data" is available for characterizing the Black Rock site (p. 75). How much faith can be placed in design criteria possibly based upon modeling results which might change at a future date as more information becomes available? 19

1.6 The groundwater computer model presented in document TS-YSS-19 does not address the possible effects of reservoir seepage upon contaminants present in the subsurface at the Hanford site. How might the predicted increased flux at the western boundary of the Hanford site relate to potential contaminate mobilization? Nor was the computer model used to evaluate potential reservoir seepage should a cutoff wall keyed into basalt be placed through the sedimentary deposits at the proposed damsite. 20

1.7 The radius of influence of the hydrologic tests conducted is of little extent. The hydrogeologic testing program has yet to evaluate a "significant" portion of the proposed dam and reservoir sites. The 2005/2006 hydrologic testing program reportedly had a maximum radius of influence of 50 feet, basically a pinpoint on the proposed reservoir footprint. 21

2. General Comments

2.1 Hydrogeologic Testing Program
There would be a need to conduct a hydrogeologic investigation of the proposed Black Rock dam and reservoir sites for further consideration of the proposal. The hydraulic properties of the site sedimentary sequence, and the Saddle Mountains and Wanapum Basalts would require definition so the potential effects of reservoir seepage could be evaluated. The hydrogeologic characteristics of the proposed south and north dam abutments would need to be evaluated to study possible seepage and dam safety issues. A conceptual hydrologic testing program is discussed in Sections 3.1.12 and 4. 22

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2.2 Hanford Contamination
The issues regarding the potential mobilization of contamination present within the subsurface at the Hanford site were apparently not addressed by the Bureau of Reclamation groundwater modeling study presented in document No. TS-YSS-19 or other Black Rock technical documents which were reviewed. The questions regarding the effects of potential reservoir seepage on the Hanford site were stated to be better addressed by the site specific Hanford groundwater model then the regional USGS groundwater model used to evaluate potential reservoir seepage. Groundwater modeling results were presented as a series of figures showing increases in hydraulic head radial to the proposed reservoir and within the boundaries of the Hanford site. No discussion was presented regarding the potential effects of the head increases upon the hydrogeology of the Hanford site. Is the water table within the unconfined aquifer present in the Hanford site sedimentary deposits, for example, predicted to reach ground surface at some point during the modeled time frame. 23

3. Specific Comments

3.1 Black Rock computer groundwater model, TS-YSS-19, Sept. 2007

3.1.1 It is stated several times in document TS-YSS-19 that limited aquifer testing has been accomplished at the Black Rock site. Increasing the amount of available hydrogeologic data might increase the presumed reliability of computer model outputs, and resulting estimates of reservoir seepage and other potential effects of Black Rock construction and operation. 24

3.1.2 It does not appear realistic to use a single hydraulic conductivity value for a computer model layer which hydrogeologic knowledge and testing show to be inhomogeneous and anisotropic. There appears to be something mathematically incorrect about taking an average value, transmissivity, for a stratigraphic interval where a hydrologic test was performed, and averaging this average value over the tested interval, to derive a value for hydraulic conductivity, which then becomes the specific value for the tested interval, then following completion of a sequence of hydrologic tests within the same stratigraphic unit have been completed the results are again averaged and a specific hydraulic conductivity value determined for inclusion in the computer model. 25

Additionally "long term" pumping tests show that aquifer transmissivity and storativity will change as pumping time increases as the pumping well's cone of influence enlarges to encompass a larger mass of aquifer material. Pumping tests have shown this to be a fact in both sedimentary valley fill and layered basalt aquifer systems. Transmissivity generally will decrease with increased pumping time as regions of lower hydraulic conductivity are encountered, while storativity will increase with increased pumping time as the rate of vertical groundwater leakage increases as groundwater level drawdowns within the pumped aquifer increase. Can the USGS regional groundwater model for the Columbia Plateau simulate these conditions? 26

Additionally, it is stated several times in document TS-YSS-19 that limited aquifer testing has been accomplished at the Black Rock site. This results in limited site-specific data to specify model conditions. 27

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Reclamation's Planning Report/ EIS Comment Responses

3.1.3 It appears that a steady state groundwater model was calibrated with transient data (p. 29). Irrigation season in the Yakima River Basin generally occurs from March through October, after which the wells are shut-in and groundwater level recovery begins. Additionally, the economics of pumping groundwater from the Columbia River Basalt aquifer system often forces the termination of pumping from wells that formerly had been used to provide irrigation water for crops of marginal value. Data from the Toppenish Basin show that groundwater level recovery occurs for decades following shut-in of wells completed in the Columbia River Basalt that are no longer used to supply irrigation water. 28

It is also a common practice regionally to complete irrigation wells in more then one unit within the Columbia River Basalt aquifer system. The Bureau of Reclamation should provide tables presenting the information provided on driller's well logs for the observation wells used in model calibration, including the depth of a well's annulus grout seal. 29

Additionally, the calibration procedure appears to have been accomplished by the random changing of vertical hydraulic conductivities between the Saddle Mountains and Wanapum Basalts (pp. 31-32). This suggests that the groundwater model is not based upon site specific hydrologic conditions, which casts doubt upon the reliability of the models predictive capabilities,. 30

3.1.4 What is the basis for the Bureau of Reclamation's assumption that modeled heads within 30 feet of measured groundwater levels is "in reasonably good agreement with observations (p. 32)"? 31

3.1.5 The open intervals, those depths not sealed with grout, should be noted for the observation wells used to calibrate the steady state base case model (Table 5-1, p. 33). Are the observation wells completed in both the Saddle Mountains and Wanapum Basalts or only completed in a single hydrogeologic unit? 32

3.1.6 Where does the Bureau of Reclamation presume the sediment will come from which will seal the reservoir bottom (p. 38)? What is the basis for using a vertical hydraulic conductivity of 3 x 10-6 cm/sec for the sediments at the reservoir site (p. 38)? 33

3.1.7 The computer groundwater model does not consider actual reservoir operating conditions if it does not account for the State of Washington not allowing diversions from the Columbia River to the Black Rock reservoir in July and August (p. 38). 34

3.1.8 What is the percent of water diverted from the Columbia River which discharge back to the river as a result of reservoir seepage? 35

3.1.9 What is the presumed physical reason responsible of the "peaks and valleys" on the hydrographs depicting increased aquifer storage (Figure 7-6, p.42) and total reservoir seepage (Figure 7-7, p. 43)? 36

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3.1.10 It states at the beginning of Section 8.1.3 "total reservoir seepage is the sum of the increase in discharge to creeks, drains and springs, and the increase in aquifer storage (p. 52)". This implies that there is no flow of reservoir seepage through the Columbia River Basalt aquifer system which discharges into the Yakima and Columbia Rivers. This concept of no flow in the basalt aquifer system is difficult to comprehend. The Black Rock reservoir will create a recharge area upon the Saddle Mountains and Priest Rapids Basalts (see Bureau of Reclamation drawing 33-100-3473). Presumably some of this groundwater recharge will also move vertically via leakage into deeper parts of the Wanapum Basalt. Groundwater movement within the Columbia River Basalt aquifer system should be downward and radially from the Black Rock reservoir area, eventually reaching groundwater discharge areas located proximate to the Columbia and/or Yakima Rivers. **37**

It is stated on page 77 that "the GHP model predicts little increase in groundwater flow beneath Cold Creek in the Saddle Mountains and Wanapum Basalts." This also appears unrealistic. Create a new recharge area for the Columbia River Basalt and the interflow zones have sufficient transmissivity to transmit large quantities of groundwater. The USGS, for example, conducted a water resources investigation of the Toppenish Basin in the early 1970s (1975, Water resources of the Toppenish Creek Basin, Water Resources Investigations 42-74). The USGS estimated that upland recharge to the Columbia River Basalt underlying the Toppenish Basin might be as much as 118,000 AF per year, with an estimated 94,000 AF per year discharging from the basalt to the overlying Ellensburg Formation as upward leakage proximate to the Yakima River in the southeastern part of the Toppenish Basin.

3.1.11 Who is the "Committee on Fracture Characterization and Fluid Flow?" **38**

3.1.12 The additional hydrologic testing program that would be required for any further consideration of the Black Rock should be conducted in a conventional matter with one pumping well per individual test, and with observation wells constructed to monitor the groundwater level response in the pumped aquifer, and over and underlying stratigraphic units of interest. The pumping and observation wells should each be completed in only one stratigraphic unit. The pumping test locations should be located "distant" from irrigation and domestic wells which might be open to more then one stratigraphic unit. The pumping test should be conducted for a sufficient length of time to evaluate boundary conditions and groundwater leakage, which could require a week or longer of continous pumping. Packer tests can fail to provide accurate hydrologic data if groundwater leakage occurs around the packer due to poor seal and/or fracture patterns. A possible pumping test design is discussed in Section 4.1 below. **39**

3.1,13 specific storage
We could not locate the storage values used in the Black Rock computer model.
Will groundwater within the Pomona Basalt continue to be under confined conditions once the Black Rock reservoir is filled or will the Pomona Basalt become a part of the overlying unconfined aquifer system? **40**

11

Reclamation's Planning Report/ EIS Comment Responses

3.1.14 There was no computer modeling conducted to evaluate potential reservoir seepage should a cutoff wall keyed into the Columbia River Basalt be placed through the sedimentary valley fill. at the proposed dam site. **41**

3.1.15 Interbedded sediments can be in contact with and recharge basalt interflow zones at the distral ends of flows or where erosion has interrupted the continuity of flows. The statement implies a need for geologic mapping of the area to be covered by the reservoir. **42**

3.1.16 Which faults in the model domain are proven hydraulic barriers, and which faults might be transmissive, and may commingle shallow and deep groundwater, and springs? **43**

3.1.17 Is the Vantage Sandstone hydrologically part of the Frenchman Springs aquifer system or the Grande Ronde aquifer system. **44**

3.2 Dr. Frank Spane, 2007, Results of the borehole hydrologic testing program, southern abutment

3.2.1 We do not consider the 2007 hydrologic testing program to be a "detailed hydrogeologic characterization (p. 3)." The 2006/2006 hydrologic tests reportedly had a maximum radius of influence of 50 feet (p.7). **45**

3.2.2 The unsaturated zone test of Horsethief Mountain thrust fault breccia "is similar to that expected for basalt flowtops/interflow zones and only slightly higher then the geometric mean (p.6)" for other unsaturated zone tests conducted at wells DH-05-01 and DH-06-01. The unsaturated zone test of the fault zone breccia is 70% greater then the mean value reported for the Saddle Mountains Basalt at the Hanford site and 60% greater then that calculated from unsaturated zone tests of basalt at wells DH-05-01 and DH-06-01. **46**

Hanford site data to being used to evaluate the hydrogeology characteristics of the Black Rock region should be presented in tabular form so it can be reviewed by interested persons. **47**

3.2.3 Is it physically realistic to compare hydraulic conductivities calculated from data collected during unsaturated zone tests, where water is added to the tested interval creating an unnatural condition, to hydraulic conductivities calculated from data collected from tests conducted in the naturally saturated portion of a borehole? How much of the unsaturated zone becomes saturated when hydrologic tests are conducted in the unsaturated zone. **48**

3.2.4 The hydraulic conductivity for the fault zone breccia within well DH-06-01 is 40% lower then that calculated for the fault zone breccia within well DH-05-01, suggesting that using foam as a drilling fluid additive might have created a well skin effecting the hydraulic communication between well DH-06-01 and the fault zone breccia. **49**

We suggest that if the Bureau of Reclamation is going to construct wells within the Columbia River Basalt the Bureau buy or contract for equipment capable of drilling basalt without the need to use drilling water additives.

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end result is an inaccurate, incomplete portrayal reliant solely on previous archaeological investigations, and does not encompass the full spectrum of cultural resource types. Having not provided this complete portrait, levels of cultural significance are undeterminable at this time. Until a formal Class III cultural resource survey is conducted, tribal consultation pursuant to the National Historic Preservation Act of 1966, presence of cultural resources and their significance cannot be ascertained.

06

Furthermore, the enhancement, destruction, removal, replacement of *all* cultural resources, not just archaeological or historical, significant to the Yakama Nation is an issue unaddressed in this Draft/EIS. Mitigation is of the utmost importance to the Yakama Nation, as it is the Nation that has lived upon this land since time of beginning.

07

The Draft EIS does recognize there are previously recorded archaeological resources within the APE's, which are protected by federal cultural resource mandates. Because the APE's lie within the ceded area of the Yakama Nation, the Yakama Nation has sole tribal authority over cultural resources significant to it.

08

Therefore, without a memorandum of agreement between the Yakama Nation and the federal agency, the proposed project will be in violation of the National Environmental Policy Act, National Historic Properties Act, Executive Order 13007, American Indian Religious Freedom Act, Archaeological Resources Protection Act, and Archaeological and Historic Preservation Act. Costs for this mitigation would be considerable but have yet to be included in the overall economic impacts of the proposed project.

Specific concerns

Page 4-254

Section 4.20.1.1

Paragraph 3

09

The author misinterprets Ray (1939) by overstating the likenesses between Plains and Plateau after the introduction of the horse. This stance has since been displaced by Anastasio (1955,1972) and states Ray as doing the exact opposite of what the author suggests in this paragraph. He explains that Ray had refuted the Plateau as a "cultural void filled with miscellaneous items borrowed from the Northwest and Plains cultures. In fact, Ray displays the

3

Reclamation's Planning Report/ EIS Comment Responses

09

"cultural unity of the area in contrast [not in likeness] with surrounding culture areas and describes some of its major characteristics, such as the emphasis on village and band political autonomy, the stress on peaceful means for determining intergroup relations, and a number of other features." Furthermore, Anastasio continues to explain that the horse did much to intensify and change the appearance of trade between Plateau and other culture areas. If anything, the horse created a much more complex portrait of intertribal relations then is summarized by the authors' findings. The authors' summary is superficial and has managed to boil down the intertribal trading economies of Plains and the Plateau to create a mono-Plains horse culture.

10

The authors do not provide a clear theoretical approach towards defining their use of tribal groups at any point in time. The current logic jumps from tribal confederation (Yakama) to culture area (Plateau) to mish-mash of tribal confederation and an undefined group of native people (Yakama and related groups) to the village level (*tsikik*). The authors offer no temporal reference as to the political existence of these groupings or the area of which these tribal groups inhabited. Certainly the author recognizes the Treaty of 1855 and that the APE for each alternative lie within the ceded area of the Yakama Nation. But just as soon as the authors introduce this jurisdictional issue, they complicate the situation by widening the scope to include the other Columbia Plateau tribes (Umatilla Colville, Wanapum). Without an introduction to these groups and an explanation as to their relevance to the APE, the message for their inclusion is unclear and confusing.

11

The authors discount the complex trading networks that have been maintained for millennia between Plateau and not only Plains tribes but California, Great Basin and Northwest Coast tribes as well. Walker's (1997) work, along with that of Anastasio (1955, 1972), has clearly refuted the conflated concept that Plains culture has had such an overwhelming impact on the Plateau, that it caused Plateau tribes to instantaneously abandon their cultural identity and social order for that of another. Setting aside that the author imagines this diffusion could have taken place 200, epidemics were also sweeping through the Plateau as was the first migration of European settlers. The epidemics, along with the posed threat of land loss, encroachment of settlers, and the religious and cultural assimilation settlers brought with them, could have just as easily caused this tighter political alliance between bands and tribes of the Yakama and "related tribes".

4

Reclamation's Planning Report/ EIS Comment Responses

3.2.5 Figures 2.2, 2.3 and 2.4
Dr. John W. Harshbarger, Professor Emeritus University of Arizona Department of Geology (personal communication) has recommended againstusing sand/gravel pack wells completed in basaltic aquifers for testing purposes because the sand/gravel might decrease the transmissivity of the fracture zones transmitting groundwater to a well. 50

3.2.6 It might be useful to also refer to the transmissivity of a tested interval. Geologic units of low hydraulic conductivity can potentially transmit large quantities of groundwater if sufficiently thick. The need for dewatering activities, for instance, at open pit copper mines. 51

3.2.7 p.7 "Because of the relative short duration of the tests and unconfined aquifer characteristics the radius of investigation for boundary detection was less then or equal to 50 ft."

3.2.8 p.6 The saturated zone tests at wells DH-05-01 and DH-06-01 was hampered by completion of well DH-05-01 in both the unconfined fault zone breccia and the confined Pomona Basalt, incomplete isolation of test intervals, and the short duration of testing. 52

3.2.9 p.6 The hydraulic conductivity of the Horsethief Mountain thrust fault zone breccia, 1 x 10-4 to 4 x 10-4 cm/sec, may decrease with increasing depth within the fault breccia. 53

The hydraulic conductivity of the Pomona Basalt at wells DH-05-01 and DH-06-01, 1 x 10-4 to 0.019 cm/sec, is perhaps greater then the fault zone breccia due to ancillary fracturing due to the overlying Horsethief Mountain thrust fault. 54

3.2.10 p. 7 Testing of confined groundwater within the Pomona Basalt at wells DH-05-01 and DH-06-01 indicated leakage, which was likely not natural but related to the completion of well DH-05-01. 55

3.3 Appraisal assessment of geology at damsite, TS-YSS-5, Dec 2004
3.3.1 There was little return of drilling fluid during 2004 drilling activities.

3.3.2 The document mentions the alternative Black Rock damsite would require 10,000,000 cubic yards more embankment material then at the original damsite. We could find no information regarding how much embankment material will be required at the original damsite. 56

3.3.3 Three landslides are present on Horsethief Mountain ridge.

3.3.4 The basalt foundation at the alternate damsite is fractured, broken and of low rock quality.

3.4 Draft planning report/environmental impact statement, January 2008

13

3.4.4 Computer groundwater modeling indicates reservoir seepage will increase groundwater flow into the Hanford Reservation.

3.4.5 The National Economic Development Alternative which evaluates economic benefits indicates none of the alternatives studied meet the economic requirements for development.

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3.5 Dr. Frank Spane, 2004, Results of FY2004 borehole testing
3.5.1 p. 6 Groundwater within the Selah and Mabton interbeds at wells DH-04-01 and DH-094-02 should be considered to comprise a single groundwater flow system. 57

3.5.2 p. 68 The flow interior of the Pomona Basalt may or may not form a barrier to vertical groundwater movement in the vicinity of wells DH-04-01 and DH-04-02. 58

3.5.3. p. 68 Groundwater samples collected from the Selah and Mabton interbed at well DH-04-02 indicate similar chemistry.

3.6 The Washington Atlas and Gazetteer (DeLorme, 2001) depicts "flowing wells" near the junction of State Highways 24/240. We have found no discussion in the technical documents reviewed regarding the stratigraphic unit these wells are completed in or their yield. 59

3.7 Does the Bureau of Reclamation intend to leave the Ringold Formation and associated sediments intact at the proposed Black Rock damsite if the dam is constructed? 60

4. Future Studies

4.1 Pumping Tests

4.1.1 There would be a need to conduct "long term" pumping tests to determine hydrogeologic characteristics of the Ringold Formation and associated sediments, the Saddle Mountains and Wanapum Basalts, and the Horsethief trust fault and underlying "confined" aquifer in the Pomona Basalt. The pumping test should emphasize the evaluation of aquifer transmissivity, storativity, vertical leakage and boundary conditions. Pumping tests of at least 7 days, 10,000 minutes, in length should initially be planned. The pumping tests should be designed, conducted and evaluated in a manner consistent with methods discussed in Walton (1962, Selected Analytical Methods for Well and Aquifer Evaluation), Lohman (1972, Groundwater Hydraulics, USGS Professional Paper 708), and Kruseman and deRidder (1990, Analysis and Evaluation of Pumping Test Data). 61

4.1.2 Dr. Frank Spane, 2007, p. 83, #6

14

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61

"Subsequent test site characterizations should include efforts to characterize the hydraulic conductivity and sealing characteristics of any low permeability unit that may significantly impact vertical groundwater flow."

4.1.3 Dr. Frank Spane, 2004, p.2
"To assess the hydrologic impact of the potential Black Rock Reservoir on local and surrounding areas, detailed hydrogeologic characterization of geologic units underlying the proposed site is required."
"Of particular importance is the potential leakage of surface water stored within the reservoir, which may alter existing groundwater systems and adversely impact adjacent surface and groundwater basin hydrologic conditions, the Hanford Site."

4.2 Hanford Studies
A rigorous evaluation of the possible consequences of reservoir seepage upon contaminants present within the subsurface at the Hanford site would be required for any further consideration of the Black Rock alternative.

4.3 Bureau of Reclamation
It is stated in document TS-YSS-19 that "additional geologic drilling and aquifer testing in the area of the right dam abutment and the Dry Creek drainage are considered essential for building confidence in a single conceptual model, and a prerequisite for more rigorous quantification in the Black Rock model results (p. 55)."

62

4.4 Columbia Geotechnical Associates, 2004, pp. 40-41
4.4.1 Additional geologic mapping should be undertaken to increase the understanding of the stratigraphy and structural geology of the area near the proposed damsite as part of any further consideration of the site.

4.4.2 The geometry of the north slope of the Horsethief Mountain anticline and the Horsethief Mountain thrust fault would need to be defined because of their landslide potential. Dams have been overtopped by stored water displaced by landslides.

4.4.3 Geologic mapping of the proposed damsite north abutment would be required.

4.4.4 The stratigraphic relationship of the Pomona Basalt flow on the floor of Black Rock Valley requires definition.

4.4.4 The extent of the Elephant Mountain Basalt is not known.

4.4.5 The distribution, thickness and character of the valley floor gravels requires definition.

4.4.6 The stratigraphy of the Columbia River Basalt aquifer system in the vicinity of the Black Rock dam and reservoir sites is not entirely clear.

4.4.7 Additional study would be needed to locate and define area geologic structures.

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Reclamation's Planning Report/ EIS Comment Responses

Ecology's Comment Response Numbers in this Document

General Comments on EIS

Xv The 82 kaf M&I goal seems high. It may neglect the fact that most urban development is occurring in currently irrigated areas, which greatly reduces or reverses net water needs. 63

Xvi remove "natural", replace with unregulated 64

Xvii Change wording: ~~Demand for water~~ Existing water rights from the Yakima River cannot always be met in years with below-average runoff. 65

Xxiii ***Municipal Supply Provided:*** It is not clear how the calculation is done to show that Muni supply would get 68,000 acre feet of new water from Wymer in a 1994 type year while proratable irrigation would only receive an additional 2% under their 1905 rights. 66

67 Xxv Unclear what is meant by "change the allocation of conserved water" 67

68 Xxv It may not be true that Market Based Reallocation between districts "would not require
any construction". It is likely that structural modifications would be required to facilitate out of district transfers while continuing to meet in-district need for those not transferring water (given that older delivery systems tend not to operate well at reduced flow levels). 68

69 Xxv Edit Groundwater Storage Alternative. Delete "large" before infiltration basins unless they have been sized. Last Sentence should say "this alternative would require construction of some combination of facilities, possibly including (your list) depending on design." 69

Xxxi Wymer: Is this saying that doubling winter flows causes less than 10% habitat increase in the Cle Elum River? 70

Xxxii The lack of effectiveness stated for some alternatives suggests the need for an integraged package. For example, where increasing flows would fail to improve access to side channels, an accompanying program of habitat improvement should be planned and evaluated. 71

72 We believe the Groundwater Storage Alternative has underestimated the volumes of water that could be stored for beneficial instream and out of stream uses. We will continue to evaluate that alternative further in the context of the Storage Study beyond the EIS process. 72

16

Comment Letter TRB-0001 – Confederated Tribes of the Yakama Nation – Ralph Sampson, Jr.

01 through 66	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
67	As described in Section 3.2.3 of the January 2008 Draft Planning Report/EIS and in Section 2.3.7 of this document, the Enhanced Water Conservation Alternative proposes to change the allocation of conserved water. Under the existing YRBWEP requirements, two-thirds of the conserved water resulting from conservation measures is assigned to instream flows and one-third is retained under the implementing entity. The Enhanced Water Conservation element of the Integrated Water Resource Management Alternative proposes two other options for allocating conserved water 1)two-thirds of the conserved water would be allocated to the implementing entity and 2) all of the conserved water would be allocated to the implementing entity.
68	Ecology agrees that some structural modifications may be required for Market-based Reallocation between districts. Additional information about potential construction impacts associated with market-based reallocation is included in Chapter 4 of this document.
69	The statement to which you refer was included in the Executive Summary of the January 2008 Draft Planning Report/EIS, which is not included in this document. The intent of your edits has been incorporated into the Summary chapter of this document and in the analysis of impacts in Chapters 4 and 5.
70 through 71	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
72	Comment noted. Ecology acknowledges that additional study is required to determine the volumes of ground water that could be stored.

Comment WAS-0001

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March 31, 2008

David Kaumheimer
Environmental Program Manager
U.S. Bureau of Reclamation
Upper Columbia Area Office
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Yakima, WA 98901-2058

SUBJECT: Review of Draft Planning Report/EIS – Yakima Basin Water Storage Feasibility Study

Dear Mr. Kaumheimer:

The Washington Department of Fish & Wildlife has reviewed the Draft PR/EIS for the Yakima River Basin Water Storage Feasibility Study (**SFS**) and provides the following assessment and comments. Our comments reflect our mandate to "… preserve, protect, perpetuate, and manage the wildlife and food fish, game fish, and shellfish in state waters and offshore waters" (RCW 77.04.012).

We would like to reiterate the importance of providing instream flows for fish in the Yakima Basin as well as the other watersheds in the Columbia Basin. We support opportunities to increase flows in the Yakima Basin that benefit the species we are mandated to protect, perpetuate and manage. In addition it is important for the DPR/EIS to recognize the benefits of increased flows for fish in the Yakima Basin. Our comments follow.

Reclamation's Planning Report/ EIS Comment Responses

Technical Reports

The purpose of the Yakima River Basin Water Storage Feasibility Study is to improve instream flows and out-of-stream water availability in the Yakima River. The DPR/EIS does a reasonable job of covering the general topics of concern for instream flows for fish, but it relies on information from other documents and models to form conclusions. The information is referenced but not available within the DPR/EIS. One must read and review all technical reports to be able to adequately comment on the findings and conclusions of the DPR/EIS. In addition, there were other technical reports, more specifically the U.S. Department of Energy analysis of seepage from the Black Rock alternative that will not be available until the final version of the PR/EIS is released. We would like to propose an extended comment period for the final PR/EIS so that the public has an opportunity to provide comments on all the relevant documentation. 01

Executive Summary

Table ES.1

The April target flow for the Wapato Reach (Parker Gage) appears to be erroneous. 02
April is the primary month for spring chinook, coho and steelhead smolt downstream migration and mean monthly flow should be significantly higher than in March---not 300 cfs lower. This is the case for all the other reaches, but not the Wapato Reach---the key reach that the System Operations Advisory Committee (SOAC) monitors during smolt migration to determine if migration pulse flow releases from storage are required. Under-estimating the April flow objective for the Wapato Reach would likely affect the anadromous fish benefit analysis and comparisons between each of the "Joint Alternatives".

Page xix. Accomplishments. - The Wapato Reach does not represent the lower 40 miles of the river. It does not compare fish use, fish stocks, channel morphology, 03
island habitat, bedload material, velocity, and in many areas, volume (flow volume varies because of gage placement and return flows). It's functions and values are much more dynamic and complex, especially because of its proximity to the free flowing portion of the mainstem Columbia River.

Table ES.2

The entire analysis of anadromous and resident fish benefits in the SFS is based on the "seasonal volume objectives" in Table ES.2, which are derived from the monthly flow 04
objectives in Table
ES.1. There is a very significant error in the calculation of the volume objectives for both the Ellensburg and Wapato reaches during the "spring" and "winter" seasons (see Excel spreadsheet attachment). WDFW staff used this spreadsheet to check the volume objectives and found significant discrepancies. Oddly, the "summer" season volume objectives were correct, but all the spring and winter objectives in Table ES.2

over-estimate the true volumes required to achieve the monthly flow targets in Table ES. 1. The discrepancies ranged from a low of 51,079 acre-feet (Spring, Wapato) to a high of 411,395 acre-feet (Winter, Wapato). Since the "No Action" alternative is compared to the volumetric seasonal flow objectives and the "Joint Alternatives" are compared to the "No Action" alternative to measure relative accomplishments, a significant mathematical error in establishing the volumetric flow objectives at the very beginning casts doubt over the validity of the entire comparative benefit analysis. The entire benefit-to-cost analysis (BCA) must be run again using the correct volumetric seasonal flow objectives before the Final PR/EIS can be issued. 04

Page xx and Table ES.2 – It would be helpful to put the cubic feet per second (cfs) conversion for acre-feet (af) in parentheses. Although af is the unit for storage, cfs is the unit for flow. Other areas of the DPR/EIS compare seepage and volume using different units. Please consider utilizing one unit or putting the second unit in parentheses so that comparisons are transparent and easily understood. 05

Page xxi – Black Rock Alternative - "Water from the Columbia River would be pumped from the Priest Rapids Lake any time Columbia River water is available in excess of current instream target flows and storage space is available in a Black Rock reservoir, with the exception of July and August, when no Columbia River withdrawals would occur." Instream flows were set in the 1980s with limited information before ESA listings. It is questionable to assume that those instream flows are a threshold for no impact at higher flows.In addition, spring water withdrawals could potentially modify flows to the degree that some bird nesting islands would be connected to the shore and would allow access for predators such as coyotes and foxes. Terminology for instream target flows elsewhere in the DPR/EIS suggest that the Columbia River instream target flows refer to the 2004 BiOp flows, but the terminology should be clarified, at a minimum, and if the BiOp flows are not what is meant, then clarifications should be made. 06

Page xxx - Anadromous Fish; No Action Alternative - Under current conditions an ongoing decline in fish population is evident (wild or natural stock) and under drought conditions population impacts are probably severe. In the same paragraph that a "no effect" is noted, the authors state that "the greater spring flows downstream of Parker are considered beneficial to improve anadromous salmon smolt outmigration through the middle and lower Yakima River. Please clarify this contradiction. Also clarify how increases in velocity influence riparian, floodplain, and side channel habitats. 07

Page xxxi - Anadromous Fish - Please clarify the rationale regarding how higher flows result in reduced summer rearing habitat in the lower Yakima River 08

Page xxxi - Anadromous Fish -The Joint Alternatives may also provide opportunity to affect access to habitat and habitat conditions in the tributaries. See more comments on this subject below.

Resource Analysis – Water Resources/Anadromous Fish:

No Action Alternative

This discussion fails to recognize the benefits to fish resources that will occur if water conserved under the existing YRBWEP Basin Conservation Program (BCP) can be "blocked up", stored in the existing reservoirs and called on for release by SOAC to meet highest priority fish needs. The fish managers need the flexibility to use "conserved fish water" to maximize benefits. Incremental increases in summer flows in the Wapato Reach (below Parker Dam) may not be the highest priority use of this water. Flow objectives within various reaches would expect to vary with varying storage options. 09

Anadromous Fish

Ignoring, for the moment, the flaws with the comparative benefit analysis described above, the Black Rock Reservoir (BRR) alternative appears to provide the highest level of benefits for anadromous fish. However, the $8.7 million over the 100-year benefit stream (i.e. approximately $87,000 annual increase relative to the "no action alternative") seems ridiculously low relative to $602 million for recreation and $287 million for M&I water use. The benefit analysis is too narrowly focused and does not quantify the synergistic benefits to on-going habitat protection and restoration projects funded by USBR's YRBWEP program, the Salmon Recovery Funding Board (SRFB), Yakima Tributary Access and Habitat Program, Water Acquisition Programs, Regional Fisheries Enhancement Group, BPA's Fish & Wildlife Program, and others. Significant improvements in anadromous fish abundance (particularly spring chinook and coho salmon) have already occurred because of habitat projects without the benefit of more water that can be stored, "shaped" and released at the discretion of the fish managers. The SFS Team needs to estimate how SOAC-managed flow releases using 500-800 KAF annually from the BRFR can leverage habitat protection/restoration projects to increase fish production at much higher levels than currently modeled. 10

The benefit analysis of the Joint Alternatives also ignores the opportunity and value of storage in improving flows (and leveraging habitat improvements) in key tributaries for the benefit of steelhead, coho, spring chinook, rainbow/cutthroat trout and bull trout. SOAC would not limit use of stored blocks of "fish water" solely to increase mainstem flows below the existing USBR reservoirs. The Study Team should show how stored "fish water" under the three joint alternatives would typically be distributed between the reservoirs (i.e. where and how much). Then the Study Team should work with the SSTWG to identify creative ways using existing irrigation system infrastructure (or improvements) to deliver fish water released from reservoirs to tributaries and other off-channel habitats as recommended by the authors of the "Reaches Project" (Stanford et al., 2002) and discussed in the PR on Page 1-21. 11 12

The six indicators for evaluation of fish benefits: Summer Rearing Habitat in the Easton and Ellensburg Reaches for Spring Chinook and Steelhead Fry and 13

13

Yearlings; Flip-Flop in Both the Upper Yakima and Naches Rivers for Yearling Steelhead and Spring Chinook; Spring Flow Downstream from the Parker Gage; July-September Flow Downstream from the Parker Gage; Estimated Anadromous Fish Population Size; and False Attraction, are reasonable, but two others, Side Channel Connectivity and Winter Habitat Conditions in the Yakima River basin, should also be considered. Interaction of water quality and physical habitat (modeled in instream flow studies) is not addressed, but could be significant. Side Channel Connectivity - A specific concern is connectivity of off-channel or lateral habitat with the Yakima River. There is some discussion of floodplain processes, including cottonwood recruitment, and there is recognition that floodplain and river have become disconnected to a large degree (e.g., see 1.2.2.1; 1.7.2.3; 1.7.2.4; 4.8). Lateral or off-channel habitat is connected to the main channel at high flow. As flow drops, lateral habitat disconnects from the main channel. Fish, usually juveniles that are in the lateral habitats when they become disconnected, are forced to stay in the lateral habitats until they are reconnected. Once disconnected, usually in late spring or early summer, the lateral habitats may warm more than water in the main channel, often to temperatures that are not favorable or even lethal to young salmonids (in the absence of groundwater connectivity). If, on the other hand, connectivity persists into the warming period, a temperature gradient may develop that leads young fish to leave the lateral habitats at the time when favorable habitat shifts from the lateral habitats towards the main channel. This timing and temperature and rate of flow change (ramping) aspect of connectivity are not addressed, yet it has great potential to affect survival and production of salmonids, particularly coho and spring Chinook salmon.

Winter Habitat Conditions in the Yakima River Basin - Winter conditions get relatively little attention in this document. Most concern has been focused on spring, summer, and fall, but winter water is stored and flow management practices do influence fish habitat and survival. Flow stability is generally favorable to winter salmonid survival and storing any winter flow pulses buffers downstream reaches from such pulses. On the other hand, keeping flows low in winter increases risk of freezing of young fish and eggs. Some flow fluctuations in winter is often desirable to moderate very cold water temperatures.

Fish that spawn below Prosser are impacted significantly by river operations and flow management. In many years, there is a significant difference in spawning (both fall Chinook and coho) between the lower reach and the Wapato reach. The lower reach had over 3,000 fall Chinook adults that never passed over the Prosser fish passage facilities and spawned in the Yakima River in the late 1990's (See Watson's PSMFC reports on lower Yakima River spawning estimates to supplement Table 4.24). Since then, the redd counts below Prosser have declined with the loss of spawning habitat attributed to star grass colonies. Those habitat functions remain and could be manifested if the river conditions (flow and water quality) change within this reach.

The proposed Black Rock management emphasizes minimum Columbia River diversions at the expense of more normative flows. In wet years, more water would be diverted from the Yakima River rather than from Black Rock, missing the opportunity to provide more normative flows and flow variability with higher

flows in wetter years. On p. 2-4, the DPR/EIS refers to: "Title XII target flows do not necessarily provide for a natural (unregulated) ecosystem function. Title XII target flows at the two control points do not address fish habitat and food web needs at the basin level and thus, by themselves, cannot be expected to lead to restoration of anadromous fish runs (SOAC, 1999)."

Chapter 2 - Joint Alternative

The proposed Black Rock management emphasizes minimum flows at the expense of normative flows. In wet years irrigators would get more water and would get it from the Yakima River rather than from Black Rock, leaving Black Rock more full and missing the opportunity to provide more normative flows and flow variability with higher flows in wetter years. On p. 2-4, the DPR/EIS refers to: "Title XII target flows do not necessarily provide for a natural (unregulated) ecosystem function. Title XII target flows at the two control points do not address fish habitat and food web needs at the basin level and thus, by themselves, cannot be expected to lead to restoration of anadromous fish runs (SOAC, 1999)."

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Page 2-4, Table 2.2 - The seasonal volumetric flow objectives in Table 2.2 for the Ellensburg and Wapato reaches do not match the values shown in Table ES.2 (and Table 2.10). The objectives shown in Table 2.2 are closer to the actual objectives shown in WDFW's attached Excel spreadsheet, but are still erroneous. WDFW has not checked the volumetric flow objectives for the Easton, Cle Elum or Lower Naches River, but we suspect they may also be incorrect. The Study Team needs to check your math calculations to make sure your flow objectives are correct and are displayed the same in all tables throughout the document. Otherwise, comparison of goal attainment and monetary benefits between the "no action" and "joint alternatives" will be erroneous and invalid. Simple math errors in calculating volumetric flow objectives do not "inspire confidence" that more complex fish benefit model outputs (e.g. DSS, AHA and EDT) can be trusted to be accurate.

15

Page 2-31, Tables 2.10 and 2.11; Page 2-35, Table 2.12 - The flow objective values in Table 2.10 are the same erroneous values shown in ES.2. Consequently, the differences between the "no action" alternative flows and the volumetric flow objectives shown in Table 2.11 are incorrect. For example, the difference for Umtanum – Spring is **not -9%**, but is **actually +6%** when compared to the true objective of 646,355 ac-ft (not the erroneous 741,915 ac-ft shown in ES.2 and Table 2.10). There is no way to tell if the flow comparisons (percent differences) between the joint alternatives and "no action" in Table 2.12 are accurate because only model result totals are shown in Table 2.10. The flow objective totals are incorrect in Table 2.10; hence the volume totals for the various alternatives may also be incorrect.

16

Page 2-48 and Table 2.21 - The lowest proposed level for Black Rock Reservoir is 80 percent in July and September, respectively. Please clarify why Black Rock Reservoir volumes are maintained at 80 percent or greater year round. Holding the reservoir at lower levels may benefit migrating fish in the Columbia River during September.

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Page 2-55; Page 2-57, Table 2.30

17

The Wymer pump station has to lift (i.e. push) water to elevation 1,730’ (not elev. 1,610’) in order to fill the reservoir to full pool. The pipeline discharge into the reservoir may be at elev. 1,610’, but full pool elevation is 120’ higher. The “top of inactive (dead) storage” elevation in Wymer Reservoir is incorrect…it should read 1,375’ to coincide with the low-level outlet elevation.

18

Page 2-70 Operations - Does the proposed pipeline for the Wymer Reservoir and pump exchange alternative go across Amon Creek in Yakima River delta? Amon Creek is completely absent from the impact analysis.

19

Page 2-70 Operations - The amount of water delivered through the pipeline for the Wymer Reservoir and pump exchange alternative is less in a wet year than a dry year. Please evaluate the value of high flows for fish life and consider maintaining dry year pump exchange totals in a wet year as well. Evaluation should include floodplain analysis, hydro-geo analysis, bedload movement, increased values for rearing, etc. To provide for the maximum extent (benefit) of improved stream flows, this extra water should stay in the river. In order to achieve fish stock restoration, the habitats and river channel need high flows to restore instream, riparian, and floodplain diversity. Diversity and complexity contribute to a healthy river ecosystem.

Page 2-71/72

20

The irrigation season flow objective (and equivalent volume) at the Parker Gage (Wapato Reach) for the Wymer + Pump Exchange alternative is stated to be 1,500 cfs, less the YRBWEP Title XII flows and water conservation gains. Establishing a 1,500 cfs flow objective is a substantial improvement relative to the “no action” alternative, particularly during the summer period (July-Oct.), and should not be minimized. This flow objective provides an additional 48,708 ac-ft for Wapato Reach summer flow relative to the 1,300 cfs target flow used to evaluate the BRR and

“Wymer Only” alternatives. However, during the spring period, operating the pump exchange to supplement YRBWEP flows up to 1,500 cfs only provides a combined total volume of 362,340 ac-ft, as opposed to the target for BRR and “Wymer Only” of 729,331 ac-ft from Table ES.2, 2.2 and 2.10 (using the WDFW corrected volumetric objective from the attachment). The difference of 366,991 ac-ft represents an unfair comparison---a much lower target that makes a straight benefits comparison with the other two joint alternatives difficult to impossible (an “apples vs. oranges” comparison). All three joint alternatives should be evaluated against the same volumetric flow objectives.

21

Page 2-76 - 2.7 Economics, Fisheries Benefits - Please provide an analysis of population structure. In order to produce harvestable fish that are valued, some percentage of each generation must spawn successfully and the relationship between spawners and harvestable surplus may not be linear. In addition, extensive recent literature has pointed to the role of carcasses of adult spawners to contribute to subsequent generation’s growth and productivity; this is also likely

to be a non-linear relationship.

Page 2-95, Fisheries Benefits

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There are a number of problems with the anadromous and resident fish benefits analysis that reduce or ignore benefits that can be expected to accrue during the 100-year benefit stream used in the analysis:

22

1) The analysis does not include sockeye salmon, which are proposed for reintroduction into Cle Elum and Bumping Reservoirs under the USBR storage dam fish passage program, and which is currently in the feasibility phase. Considering the long-term benefit period for the storage study, it is reasonable to assume that permanent upstream and downstream fish passage facilities can and will be constructed and sockeye re-established. The “use values” of a Yakima Basin sockeye run should be estimated and included in the benefits analysis.

23

2) Yakima steelhead are harvested in Columbia R. tribal commercial and subsistence fisheries (Zone 6) and Yakima R. tribal subsistence fisheries. Unlike the non-treaty commercial and sport fishery, the treaty tribes harvest wild steelhead as well as hatchery fish. The statement that wild Yakima steelhead (there are no hatchery steelhead in the Yakima Basin) have little to no “fishery use value” is incorrect. Use values for these two harvest categories need to be computed for steelhead and included in the benefit analysis. Table 4.26 (Page 4-115) does show tribal harvest of steelhead, but no benefit is calculated in the economic analysis.

24

3) Use values for non-listed resident fish species (e.g. kokanee in reservoirs; rainbow and cutthroat trout in streams) are not calculated. These species will benefit to varying degrees from fish-oriented water management under the joint alternatives like anadromous species. Resident trout in rivers currently support an important sport fishing commercial guide industry that contributes to the local economy, as well as non-commercial recreational fishing that has measurable economic value.

25

4) “Non-use” (non-consumptive) values for both anadromous and resident fish are excluded from the benefit analysis. Significant increases in abundance, productivity, distribution and life history diversity of ESA-listed steelhead and bull trout should accrue from creatively managing as much as 500-800 MAF of stored “fish water blocks” (i.e. BRR alternative). Even though no harvest of bull trout currently occurs and steelhead harvest is limited to tribal commercial (Zone 6) and subsistence fisheries, the benefits analysis ignores the very real costs to society required to recover these ESA “threatened” species. If any of the joint alternatives can produce demographic benefits leading to the de-listing of steelhead and/or bull trout, these societal costs can be avoided and recovered populations can begin to provide fishery “use

values". "Avoided costs" of T&E species recovery that can be directly attributed to storage study alternative accomplishments should be used in the fish benefit analysis. 25

Page 2-101 - Economics – The watchable wildlife public expenditure component(s) is underestimated. There is a lack of analysis indicating how restoration efforts will lead to increased nonuse value benefits by the public. 26

Page 2-106; Table 2.66

Not much significance is given to T&E species in the Environmental Quality (EQ) Evaluation (only a combined weight of 4%). This is probably because steelhead and bull trout are considered "non-use" species and currently do not contribute economic benefits to the Benefit: Cost Analysis (BCA) because "avoided costs" of ESA species recovery are not counted as economic benefits. Table 2.66 shows "zero" significance (no effect) for bull trout for any of the joint alternatives and only minor positive effects for steelhead. WDFW believes that creative use of 500-800 MAF of stored "fish water" that can be managed by the SOAC fish managers annually to enhance flow and leverage habitat protection/restoration in the mainstem, tributaries and reservoirs, has the best chance of leading to the recovery of steelhead and bull trout. 27

Page 2-115 - Various reaches of the Columbia River are also designated as a Wild and Scenic River reach and this information should be included. 28

Page 2-115 and Table 2.69 (also Table 4.25) - Tables 2.69 (also Table 4.25) list expected quantified effects of the different proposals. For fish, the benefits are modest, although the Black Rock alternative appears to provide the greatest benefits to salmonid habitat identified in this chapter, based on the indicators in 4.8.2.1; however, Side Channel Connectivity and Winter Habitat Conditions in the Yakima River basin should also be considered. 29

Page 2-115 and Table 2.69 - Aquatic Invertebrates benefits are understated. The analysis does not include the potential production of the reservoir habitat. There are also tributary aquatic invertebrate benefits that would add to the quantitative, as well as qualitative measures if tributary habitats were included in the studies. 30

Instream Flows

- Columbia River flows

  The rate of withdrawal from the Columbia River mainstem is discussed as a proportion of daily pool and flow fluctuation (see 4.8.2.2). The withdrawal from the Columbia is treated as very small, yet fish interests have emphasized the importance of flow and the potential for cumulative impacts. Work by Anglin (see 4.8.2.1) is the best analysis available of fish habitat response to flow.

  Instream flow constraints on withdrawals from the Columbia are referenced (e.g., see 2.4.2.1, Table 2.17), but there are several different possible instream flow constraints, and it is not always clear which instream flows take precedence. Ecology adopted instream flows as WAC 173-563 in the 1980s, based on limited study of instream flow needs and before most listings of Columbia River salmonids under the federal Endangered Species Act (ESA). The 2004 Biological Opinion flows developed by federal fish researchers and managers addressed instream flows needed for outmigration of smolts of ESA-listed salmonids through the Columbia River hydropower system. Seasonal constraints were developed for the Columbia River Basin Water Management Program as a result of state legislation. The document does not address these different criteria and does not indicate which of these constraints will be met. 31

  The DPR/EIS implies that no flow requirements constrain withdrawal from the Columbia River in the fall, yet upstream migration, spawning, and incubation take place then for salmon. 32

- Yakima River flows

  The driving instream flow targets are addressed (e.g., Tables 2.1, 4.1) in the DPR/EIS for the Yakima River. Given there are several sets of instream flows (Title XII, SOAC, SSTWG; see Tables 2.1, 2.2), it would be helpful to compare the instream flow targets in one table. 33

Ecology's Comment Response Numbers in this Document

Chapter 3 - State Alternative

34 Page. 3-5 - Please note error in a-f Total column of Table 3.1 for Cascade Irrigation District (288 should be 2088). Kiona Irrigation is also confusing between a-f columns. 34

35 Page 3-5 - Table 3.1 notes various amounts of trust water. Please provide a discussion on the intended use of the saved water. 35

36 Page 3-23 and Table 3.3 - Please elaborate on the potential impacts in the anadromous fish section. 36

Chapter 4 - Affected Environment and Environmental Consequences

Page 4-2 - 4.2.1.1 River Regulation - Early in the document Reclamation notes how important Stanford et al 2002 recommendations are for restoration of normative flow. Stanford et al 2002 is rarely referenced again in the entire document. This is an 37 important reference for noting deficiencies and how to achieve potential biological gains. The DPR/EIS should compare the various alternatives and their ability to meet Stanford et al 2002 recommendations. This section provides an opportunity to incorporate and discuss the Stanford et al 2002 recommendations. 37

Page 4-29 - Groundwater Resources -. It is noted that since predevelopment, a 31 percent mean annual increase in basin recharge has occurred due to application of irrigation water to croplands. Has this stabilized or will this continue to increase? 38

Page 4-33 - Irrigation return flows to the lower Yakima River account for about 75 percent of the streamflow downstream of the Parker gage. Please identify the time period for those return flows. Also, please explain how the data was analyzed (where, when, frequency, etc.). 39

Page 4-51 - Figure 4.10 is a reasonable itemization of elements of stream fish habitat, but it doesn't explain relationships. Please identify relationships. 40

Page 4-54 - 4.5.2.2. No Action Alternative - The volume of sand (fines) is important to fish survival. Excessive amounts can injure fish and cover the redds. Under any of the alternatives, sand volumes would have a direct relationship to habitat conditions and fish survival. This relationship should be considered in more detail. 41

Page 4-68, 69, and -112 (Indicator 4) - Additional information is necessary to validate the model used (Carroll and Joy 2001). Please provide how the data were analyzed, and methods of collection (when, where, frequency, etc.). The model may/could apply to a specific reach; specific time period. When flows increase 352 cfs, and 666 cfs, respectively, anywhere on the river, much less in the lower river during the summer period, the aquatic habitat is going to respond in several beneficial ways and yet temperature, DO, sediment load, and other water quality parameters are noted to experience "virtually no change". 42

Page 4-95 – Affected Environment - Please adjust fall Chinook adult upstream migration timing in table 4.23. Fall Chinook peak migration occurs at Bonneville about September 1 rather mid August is the onset of the fall Chinook upstream migration. Peak migration in 2007 at McNary Dam was September 25. 43

Page 4-95 – Affected Environment and Table 4.23 - Adjust the juvenile fall Chinook and summer Chinook outmigration window to be from April through August. 44

Page 4-95 – Affected Environment - Under status and distribution, include the upper Columbia River fall Chinook stocks. The DPR/EIS states, "to some extent, in Priest Rapids Lake..", but does not describe any further spawning or dam counts further up the river. The Wenatchee River is well known for fall Chinook stocks. 45

Page 4-98/99, Habitat Conditions for Anadromous Fish; Page 4-125, Cumulative Impacts

If unregulated flow with natural variability and the "interaction of these habitat elements, combined with streamflow" is so important in producing "a complex mosaic under which native aquatic species assemblages evolved and live", then why does the Planning Report ignore the fish benefits that could accrue from the joint alternatives from being able to creatively manage significant amounts of stored fish water (especially BRR)? The fish managers will continue to use SRFB, RFEG, BPA and other funding to implement prioritized habitat access, protection and restoration projects that could work synergistically with SOAC-recommended management of "new fish water" from the joint alternatives to provide significantly higher benefits than presently shown in the PR. The Study Team should attempt to factor "flow leverage of habitat projects" into the BCA to maximize productivity. 46

Page 4-103, Methods and Assumptions

Temperature

It was not indicated what model was used for temperature. The DEIS indicates that there was no difference between the Joint Alternatives and the No Action Alternative. However, no data or variances regarding temperatures were shown within the various index reaches and the parameters that were included in the model were not described. It was not indicated if only differences in the means temperatures were modeled or is changes would occur based on water year. For example, the Black Rock alternative may have resulted in notable differences in temperatures within some reaches during drought or very wet years. 47

The DEIS recognized the altered nature of the hydrograph including truncation of runoff peaks and duration and the associated effects on quality, quantity, and temporal duration of groundwater discharge to the river. However, no attempt was made to "game the model" to assess if water saved through reductions in late summer flows in the lower Yakima River might be used to increase groundwater storage through providing higher peak flows in the spring. Thus, returning groundwater might moderate temperatures in the lower river and/or associated side channels later into the summer months. If temperature modeling indicated no fish benefit associated with increased flows in the lower river due to excessive temperatures, the flow objectives should have been adjusted to use the water elsewhere and/or at different times in an attempt to maximum fish productivity. 48

For example, reducing flow objectives in the lower river for a 70day period by 600 or 900 cfs would provide about 83,000 to 125,000 acre-feet of flow respectively. If this were to be used during the April-early May out-migration period during natural spring runoff flows, increased hyporheic storage of cold water within the floodplain of the Wapato reach would occur. This may reduce temperatures in the lower river over an extended, critical time period.

Predation might be moderated as well due to increased flow volumes and colder water.

We realize that there could be an infinite number of output flow objective scenarios that could be reviewed with the DSS model. The DEIS used only one flow objectives for each stream reach assuming it would be optimal for production and/or survival of salmonids. It was apparently assumed that a flow objective roughly reflecting the natural hydrograph would be a reasonable template to use with greater weighting of importance towards some stream reaches than others. However, it was also discussed that if 650,000 acre-feet were provided to SOAC through a Black Rock alternative for fish management the water would likely be managed very differently between good water years and drought. It would be expected that flows within certain reaches would be weighted of much greater priority than in others during droughts, while other flow scenarios might be used during years with heavy snow pack. Within year adjustments would likely be necessary as well to ensure optimal use of water for fish production. An algorithm tied to *Riverware* and *EDT* models could be developed to optimize fish benefit under various scenarios.

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Page 4-104 - Two-dimensional Hydraulic Model

While we have confidence in the model we have concerns with the sensitivity of the data collection methods for the data used in the model as it may have underestimated channel complexity and juvenile salmonids rearing habitat in some reaches. Thre floodplain habitat in ythe upper Easton reach and Wapato reach are very complex and difficult to accurately survey with any method. Ken Bovee indicated that LIDAR was effective to within 1 meter and didn't penetrate dense canopy areas. It would be preferable to truth some of the LIDAR data with more traditional methods such as sonar or cross sectional measurements of the floodplain and associated side-channel habitat to ensure that an acceptable degree of precision occurred. 50

During the presentation of the DSS model it was indicated that LIDAR were sensitive to within 1 meter which may have excluded many small habitat features including shallow off channel/side channel habitats especially areas where extensive complexity exists. We much prefer sonar or transects at a subset of location to ground truth the changes in the DSS model.

The model apparently used habitat preference data for various life history stages of salmonids that was a collective opinion of various experts rather than empirical data. It was not indicated regarding whether or not this data was compared to empirical data and preference curves that are available.

Evaluation of Fish Benefits - Modeling

The areas of interest for anadromous fish incorporate the existing and proposed reservoirs within the basin, and the mainstem Yakima, Naches and Tieton Rivers

from the headwater reservoirs to the confluence of the Yakima River with the Columbia River. The areas of interest for resident fish include the existing and proposed reservoirs within the basin, and the mainstem Yakima, Cle Elum, Naches, Tieton, and Bumping Lakes Rivers from the headwater reservoirs to the confluence of the Yakima River with the Columbia River.

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- Modeling efforts are limited by available data to five stream reaches, hence it is assumed that because fish benefits created by additional flows in the lower Yakima reach were not evaluated, the data does not exist or was not provided to the modeler. Was it assumed that excessive temperatures alone during the rearing period eliminated this reach from consideration? It is our professional opinion that with increased flows and river rejuvenations that significant habitat may be established within the lower Yakima reach. Alternatives flow scenarios that change flow objectives within this reach may result in temperature moderation. 51
- The lower reach (Prosser to Columbia River confluence) is absent from most of the modeling efforts. We question the relationship between flows and habitat that indicates a decrease in habitat, even when there is a potential to increase flow by as much as 50 percent. Were only direct flow increases considered and not flow increases realized through hyporheic exchange within this reach? As velocity increases, especially in the lower gradient stream reaches, the juveniles seek out the low energy zones created by the horizontal and vertical increases upon the floodplain. There is a significant amount of floodplain habitat (as noted in the document) in the lower river for fish to utilize if wetted up. Please provide where and under what flow regimes the flow measurements and channel configuration data were taken. This would affect the data analysis. Also, indicate if the temperature model addressed side-channel habitat independently from the mainstem , as groundwater influence would be different. 52 53 54
- The document focuses on the mainstem Yakima River habitat functions and values. It seems that the models or estimates do not include any of the tributary values. Most of the middle to lower Yakima Basin tributaries is influenced by irrigation practices, and most of them carry irrigation return flows, including Satus and Toppenish Creek on the Yakama Reservation. A major omission in the DPR/EIS is the analysis of tributary habitat function and values, fish life and their relationship to mainstem Yakima River Reclamation operations. Increased storage in conjunction with other habitat restoration efforts would provide significantly opportunities for improving instream flow within tributaries that wouldn't otherwise be possible. 55
- The flow models used to predict habitat suitability appear to be flawed regarding flow and habitat relationships. Deprivation of and beneficial lateral connectivity is overlooked or somehow miscalculated in the five 56

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index areas (perhaps due to the math errors noted above). Please review these calculations.

- The coho and fall Chinook life history functions were not comprehensively addressed by the EDT analysis for the lower 40 miles of the Yakima River. Surrogate reaches were used instead. Applying traditional assessment methods within these reaches would be preferred to assess model precision. 57
- It is not clear how accurate the assessments of the resource indicator measurements are (Table 2.69). Flow-habitat modeling was used, but models are only our simplifications of our incomplete understanding of fish ecology. Benefits of the proposed projects (see 4.8.2.7) are greater for older year classes rather than the year classes measured. 58
- Please explain why the models indicate a reduction of flow in the lowest reach. Municipal sources appear not to be clearly delineated. 59
- The use of DSS to model coho rearing habitat is problematic (Beecher, WDFW; Brad Caldwell, Ecology). In many streams the models apparently indicate that the lowest stream flows produce the best habitat for coho based on weighted usable area and preference curves. However, much empirical data from smolt trapping by WDFW has found that increased stream flows result in successively increased coho productivity. Ecology and WDFW have typically disregarded the WUA results because of the conflict with what we know about stream flow for coho juveniles. Smolt trapping data indicates a strong correlation between higher summer/fall stream flow and resultant increased adult coho returns. Empirical data suggests that a one-percent increase in stream flow in Aug/Sept will result in a one percent increase in the adult coho population two years later. 60

<u>Page 4-115, Steelhead</u>

A 51 percent increase in steelhead adult abundance resulting from the Black Rock Alternative is not a "minor effect" (from the EQ Evaluation), especially when the benefit analysis did not use any of the new fish water to improve habitat and production in tributaries. The actual improvement should be higher if the means to direct some of the 500-800 MAF to tributaries can be identified and implemented. This is probably our best chance to recover Yakima steelhead to the level that they can be de-listed and support a sustainable tribal subsistence and terminal sport fishery. 61

<u>Page 4-118, juvenile salmonid productivity</u>

On page 4-118, it is noted in the DSS that the model assumed no changes in the existing channel configuration, just changes in flow. The limited changes in salmon and steelhead productivity for each alternative appeared linked to the altered nature of the floodplain and changes in the cross-sectional channel configuration. The incised and simplified nature of the existing channels 62

Reclamation's Planning Report/ EIS Comment Responses

62 reflected minimal gain in habitat quantity until flow stages were quite high or low. Over bank flows provided significant access to perched side channel habitats and backwater areas. The DSS model could be used as a tool to refine and prioritize where floodplain connectivity would result in the greatest fish benefit or incorporate modifications to the bed that are proposed. Gaming the model would highlight which restoration alternatives resulted in greatest production.

The various alternative also assumed that other restoration programs and alternatives would not provide synergistic fish benefits. Yakima river Basin Water enhancement Program, and Salmon recovery funds could be used to later exist water delivery systems to convey and wheel water from the Yakima River to water users current diverting from the small tributaries. Resolving instream flow fish passage barriers within the lower reaches from flow exchanges could provide better anadromous access many miles of habitat.

These exchange benefits are not reflected in the fish benefit calculations within the model.

<u>Page 4-132, Table 4.31</u>

The summary of impacts of the joint alternatives on rainbow trout and bull trout does not include any estimates of improved adult production…why? Why no attempt to estimate economic "use
values" for river-dwelling rainbow and cutthroat trout or ESA "avoided cost" values from improvement in viable salmonid population (VSP) parameters for bull trout leading to de-listing? 63

Additional Comments

- WDFW and PSMFC found that the lower Yakima River fall Chinook stock was genetically different from the Hanford Reach, Snake River, and Marion Drain Up River Brights (See 1998, 1999, 2000, and 2001 PSMFC reports). This stock warrants greater consideration regarding habitat values, habitat association and use, and identifying potential benefit from the Yakima River Storage EIS alternatives. We suggest identifying some index areas within this reach as well. 64
- Please elaborate on increased water use and the potential locations of future withdrawals for municipalities with regard to ground water sources and surface water from the Yakima River. 65
- Please consider a pipeline be built to direct flows from the outlet of Wymer Reservoir to the Yakima River rather than realigning the existing channel. Lower Lmuma Creek (below SR-821 bridge) is valuable coho and steelhead rearing habitat. 66

- There was no mention of the positive relationship between nutrients and salmonid production. There is significant literature regarding the benefit of additional marine derived nutrients on salmonid productivity. Although the DEIS assumed to channel in the existing habitat increased escape of some species, particularly fall Chinook and perhaps coho, might measurably increase productivity of existing habitats. The enhancement effects of spawning pink salmon on stream rearing juvenile coho salmon are well documented. 67

- The proposed Black Rock Reservoir could affect the existing groundwater contamination at the Hanford Nuclear Reservation. Seepage from the proposed reservoir would increase the ground water flow in the aquifer under the reservoir. This has potential to increase the movement of contaminants from the central part of the site. Such an increase in groundwater flow has the potential to change containment plume shapes, travel times, and peak concentrations. The seepage from the proposed reservoir also has the potential to raise the water table level beneath the Hanford site and mobilizing the contaminants currently in the soil. 68

Sincerely,

Jeff Tayer

Jeff Tayer
Regional Director

Attachment (Table 1 – Storage Study Flow Objective

69

70

Table 1

Mean Monthly Flow Targets and Required Volume (AF) from Tables ES. 1, ES.2, 2.2 and 2.10

Reach	March	April	May	June	Spring Total	July	August	Sept.	October	Summer Total	November	December	January	February	Winter Total	
Ellensburg																
Mean CFS	1,982	2,424	3,700	2,586		2,000	1,000	1,000	1,000		980	1,016	1,257	1,459		
Volume (AF)	121,655	143,986	227,106	153,608	646,355	122,760	61,380	59,400	61,380	304,920	58,212	62,362	77,155	80,887	278,616	
		Value in Tables ES.2 & 2.10 =			741,915		Value in Tables ES.2 & 2.10 =			304,920		Value in Tables ES.2 & 2.10 =			380,010	
				diff. =	95,560				diff. =	0				diff. =	101,394	
Table 2.2	117,938	144,238	220,150	153,849	636,175	119,000	59,500	59,500	59,500	297,500	58,311	60,446	74,807	86,821	280,385	Table 2.2 values
Wapato																
Mean CFS	3,109	2,794	3,500	2,655		1,300	1,300	1,300	1,300		1,758	1,854	2,163	2,460		
Volume (AF)	190,830	165,964	214,830	157,707	729,331	79,794	79,794	77,220	79,794	316,602	104,425	113,799	132,765	136,382	487,371	
		Value in Tables ES.2 & 2.10 =			780,410		Value in Tables ES.2 & 2.10 =			316,602		Value in Tables ES.2 & 2.10 =			898,766	
				diff. =	51,079				diff. =	0				diff. =	411,395	
Table 2.2	184,978	166,261	208,250	157,958	717,447	77,350	77,350	77,350	77,350	309,400	104,616	110,295	128,712	146,389	490,012	Table 2.2 values

= "actual seasonal volume objectives"

= discrepancy between "actual seasonal volume objectives" and values shown in Tables ES.2, 2.2 and 2.10

= **NO** discrepancy between "actual seasonal volume objectives" and values shown in Tables ES.2 and 2.10, however discrepancy exists with Table 2.2 values

J.A. Easterbrooks, WDFW
March 27, 2008

Comment Letter WAS-0001 – Washington Department of Fish and Wildlife – Jeff Tayer

01 through 33	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
34	The error has been corrected in Table 2-2 of this Final EIS.
35	Not all of the conserved water would be put into the Trust Water rights Program since the Enhanced Conservation Alternative anticipates alternative funding and allocation strategies outside the existing Trust Water Rights Program and YRBWEP. It is anticipated that water conserved through the Enhanced Conservation Alternative would be allocated to both instream flows and irrigation or municipal water supply. The conserved water would be added to the Total Water Supply Available (TWSA) bucket of water. Specific allocation of conserved water would be determined as individual projects are developed and implemented.
36	The potential impacts to anadromous fish associated with the Enhanced Water Conservation element were evaluated in Section 5.8 of the Draft Planning Report/EIS and in Sections 5.8.2.2, 5.9.2.2, and 5.10.2.2.
37 through 70	See Reclamation's responses in the December 2008 Final Planning Report/EIS.

Comment ORG-0005

From: atie Fite <katie@westernwatersheds.org>
To: <storagestudy@pn.usbr.gov>
Date: Thu, Mar 27, 2008 6: 0 AM
Subject: Black Rock and other ew Dams

Dear Washington State Department of cology, BuRec, Governor s Office and others,

We are very much opposed to the proposal to construct the new Black Rock and other dams that Governor Gregoire has proposed.

Ecology's Comment Response Numbers in this Document

Reclamation's Planning Report/ EIS Comment Responses

This is the dead opposite path that any western state should be taking. Dams have already destroyed so much of the West s natural areas, and critical fish and wildlife habitats.

1 As an alternative, to conserve water and decrease global warming and desertification processes, we ask that Washington state fully evaluate alternatives to reduce domestic livestock grazing on public and private lands in all watersheds east of the Cascades. For a small fraction of the cost of new dam construction, permits on public land could be purchased and retired The state should also immediately begin to phase out any grazing permits on D or WDFW lands. 01

2 The Governor, instead of encouraging more waste and abuse of Washington s resources through dam building and other current proposals, such as cattle grazing on WDFW and other state lands, should establish programs to diminish growing of water-wasteful livestock forage crops on irrigated lands. A shift to other higher value less wasteful crops should be state policy. 02

This, in fact, is the only path that will lead to sustainable and ecologically sound use and protection of waters and watersheds.

3 As part of this process, please provide a detailed analysis of the global warming costs of the production of all livestock, and livestock forage crops, in Washington state. 03

4 Please also provide a complete analysis of how much water is currently be used and natural stream flows diminished and wasted in livestock production. 04

Sincerely,

atie Fite
Biodiversity Director
Western Watersheds Pro ect
PO Bo 2863
Boise, D 83701

Comment Letter ORG-0006 – Western Watersheds Program – Katie Fite

01	Comment noted. Grazing on public lands is outside the authority of the Department of Ecology and outside the scope of this study.
02	Comment noted. As described in Sections 4.14 and 4.15 of the January 2008 Draft Planning Report/EIS and in Section 3.13 of this document, crops in the Yakima River basin are generally high value.
03	Information on the impacts of global warming on agriculture in the Yakima River basin is included in Sections 3.2, 4.2 and 5.2 of this document.
04	The detailed information you request is outside the scope of this Programmatic Environmental Impact Statement.

Comment ORG-0006

American Rivers
Thriving By Nature

March 31, 2008

Mr. David Kaumheimer
Environmental Programs Manager
Upper Columbia Area Office
U.S. Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901-2058

Mr. Derek I. Sandison
Central Regional Director
Washington State Department of Ecology
15 W. Yakima Ave., Suite 200
Yakima, WA 98902-3401

Via email: storagestudy@pn.usbr.gov

Dear Mr. Kaumheimer and Mr. Sandison:

Thank you for the opportunity to comment on the Draft Yakima River Basin Water Storage Feasibility Study, Planning Report, and Environmental Impact Statement (DEIS).

American Rivers is a national, non-profit conservation organization. We are dedicated to protecting and restoring healthy natural rivers and the variety of life they sustain for people, fish, and wildlife. American Rivers has a growing membership of over 65,000 members and supporters. Our Northwest office serves over 4,500 members and supporters in Washington, Oregon, and Idaho. American Rivers' programs focus on dam removal and hydropower dam reform, water management, and protecting and recovering clean, free-flowing rivers. We also advocate for protecting and restoring self-sustaining, harvestable populations of wild salmon and steelhead, which are a key indicator of the health of many Northwest rivers, including the Yakima and its tributaries. Along with our conservation efforts, American Rivers promotes public awareness of the importance of healthy rivers and the threats rivers face.

American Rivers supports improving water management and water supply for people, fish, and wildlife in the Yakima Basin. However, examining only the joint federal-state alternatives, all of which would involve the construction of large new storage dams, artificially constrains the discussion of the most biologically effective, as well as the most economically prudent, ways to improve water management and river and fish health in the Yakima Basin. Indeed, the DEIS concludes that none of the storage dam options meets the Bureau of Reclamation's (BOR) criteria to even be eligible for federal funding, which would

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almost certainly be required to construct these multi-billion dollar proposals. On the other hand, the state-only alternatives, which examine potential alternatives to new dam construction, deserve further consideration as potential pieces of an instream flow, water supply, and habitat restoration package that poses much less risk than Black Rock, carries a smaller price tag, improves the basin's ability to be resilient in the face of the local/regional effects of global warming, and is more likely to be implemented in the near future.

Reclamation's Planning Report/ EIS Comment Responses

I. The Purpose and Need of the DEIS is Artificially Constrained

01

The "Purpose and Need" of the federal portion of the DEIS is based exclusively on a narrow reading of Section 214 of the Act of February 20, 2003 (Public Law 108-7). As we mentioned in our comments on the scoping of the EIS, not only could this law be read to permit at least a somewhat more inclusive examination of alternatives, the 1994 reauthorization of the Yakima River Basin Water Enhancement Project (YRBWEP) gives the BOR authority to look at water management alternatives other than new storage. *See* Public Law 103-434, Section 1201 (Title XII).

02

The specific federal authorization for this EIS, even absent the YRBWEP authority, calls on the BOR to study "options for additional water storage in the Yakima River Basin." As the EIS does not restrict examination of storage alternatives to *surface* storage, this must include looking at aquifer/groundwater storage and recharge. As shown by the state alternative examining groundwater storage, aquifer/groundwater storage and recharge is a reasonable alternative to surface storage or no action, and NEPA regulations require a federal agency to "rigorously explore and evaluate *all reasonable alternatives*." 40 CFR 1502.14 (emphasis added). This regulation also requires discussion of why an alternative was eliminated from study, and no such discussion is provided for aquifer/groundwater storage in the DEIS.

03

The existing YRBWEP authorization would appear to allow the BOR to incorporate all the state-only alternatives discussed in the DEIS into the joint federal-state alternatives. Given that the State of Washington's Department of Ecology (Ecology) has already developed an analysis of those alternatives and included it in the DEIS, it would take minimal resources to incorporate, for federal purposes, the state's analysis of enhanced water conservation, market-based reallocation of water resources, and groundwater storage. While current federal limitations under YRBWEP may limit the federal funding available for a particular alternative, this should not be an obstacle to the BOR's consideration of the state alternatives presented in the DEIS – NEPA regulations require an EIS to include not just those alternatives for which an agency would bear primary responsibility, but "reasonable alternatives not within the jurisdiction of the lead agency." *Id.*

A. The Basis for Study Goals is Not Sufficiently Justified

In addition to its narrow scope, the DEIS suffers from a lack of sufficient justification for key assumptions with respect to its water supply goals for fish, water supply for proratable irrigators, and municipal water supply. The assumptions on future demand for water associated with each goal seems formulated to justify a massive new storage dam rather than to encourage evaluation of whether more targeted solutions might be preferable. Instead of taking this seemingly biased approach, the BOR and Ecology should take a harder look at likely future water needs for fish, farms, and communities – these needs should be analyzed in the context of the expected regional climate changes due to global warming, and the tools selected to meet those needs should be flexible enough to help the Yakima Basin's human and ecological communities adapt to a changing climate. The global warming analysis in the DEIS better addresses the former point than the latter one.

Reclamation's Planning Report/ EIS Comment Responses

i. Improving Fish Returns

The study assumes that restoring a natural hydrograph is the best way to increase steelhead and salmon numbers in the Yakima basin. Restoring the natural flow regime would undoubtedly be beneficial, but given limited resources, an examination is necessary of whether spending billions of dollars on a new dam for improved flows is better than spending a smaller amount of money on restoring flow in key river and tributary reaches, and spending at least a portion of the savings from that more focused approach on other salmon and steelhead recovery measures such as fish passage, floodplain restoration, ensuring sustainable development, hatchery and harvest reform, etc. 04

ii. Improving Water Availability for Farms

While it is clear that various processes in the Yakima basin have concluded that a 70 percent prorationing goal even in dry years is desirable for interruptible irrigators, the DEIS should determine whether meeting this goal is economic in light of the costs and benefits of the full range of alternatives (including the state alternatives alone or in combination). How would the picture change if the goal was 50 percent or 60 percent instead of 70 percent? What would be the economic effects of relying on water markets to reallocate water versus building the infrastructure necessary to meet a certain prorationing goal even in dry years? The appropriateness of looking at a lower threshold of "firm" water supply is particularly clear when one considers the limited economic benefits to agriculture relative to the costs of dam construction and operation. 05

iii. Municipal Water Supply

With respect to municipal water needs, our understanding is that the projected need for an additional 82,500 acre-feet of water by 2050 is based on an

Reclamation's Planning Report/ EIS Comment Responses

assumption that future residents of the area will use as much water per capita in 42 years as they do today. Given that water conservation and efficiency measures are far cheaper and have lower environmental impacts than building new storage, this assumption is unacceptable. In a basin facing water shortages, any new surface water rights for municipalities should be contingent on implementation of a set of best conservation practices for outdoor and indoor water use (a similar requirement for implementation of best practices should also be in effect for new agricultural water rights). At the very least, the EIS should assume that municipal water consumption per capita will decline over time as it has in other areas of the West that have implemented aggressive water conservation and efficiency programs. 06

iv. Global Warming

Finally, while facilitating adaptation to the altered precipitation and runoff patterns associated with global warming is not an official goal of the study process, the DEIS should consider in more detail which alternatives are best suited to help the Yakima Basin adjust to a changed climate. The DEIS does look at the likely general effects of a changed climate on the basin's hydrology, but it would benefit as well from discussion of the effects of global warming on reservoir evaporation rates and the (presumably) increased amount of pumping that would be required from the Columbia River. The DEIS should also compare how well alternatives such as surface storage, groundwater/aquifer storage, increased conservation and efficiency, and water markets can help facilitate efficient adaptation by human and ecological communities to the effects of global warming and at what relative cost.[1] 07

Ecology's Comment Response Numbers in this Document

II. State Alternatives Constitute the Beginning of the Broad Analysis Needed in the Yakima Basin

8 As noted above, a clear understanding of likely future demand for water (taking into account the effect of efforts to conserve water and use it more efficiently, as well as technology that will likely make it more feasible to do so) is crucial before deciding to implement a particular water management strategy, as is considering a full range of water management strategies to meet that demand. By developing non-structural water management tools – the "state alternatives" – Ecology has helped make the analysis in the DEIS less artificially constrained than it would have been if only the joint alternatives were examined. That said, the state alternatives need to be fleshed out further to provide the public with a better understanding of their potential to meet a legitimate demand projection. Without 08

[1] For more information on factors to consider when evaluating the effects of global warming on surface storage proposals, see *In Hot Water: Water Management Strategies to Weather the Effects of Global Warming*, Natural Resources Defense Council (2007), p. 35. Available at http://www.nrdc.org/globalwarming/hotwater/contents.asp.

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Reclamation's Planning Report/ EIS Comment Responses

that, water management decisions are likely to be based more on politics than on meeting the needs of communities, farms, and ecosystems.

09

9 As noted above, the state alternatives should be adopted as joint alternatives by BOR. Even if the BOR does not join in analyzing these options in violation of NEPA, given the clear environmental risk associated with Black Rock and the low benefit-cost ratio for all of the new surface storage proposals examined, we encourage Ecology to further develop its analysis of the potential of the three state alternatives, perhaps in combination with other salmon habitat restoration and water management options. In particular, Ecology should:

- 10 Analyze the potential of municipal/domestic water conservation and efficiency, including working with the Washington Department of Health to propose policies that could help meet this potential (only agricultural conservation projects are specifically highlighted in the DEIS); 10
- 11 involve a range of stakeholders in further discussions of the best way(s) to pursue market-based reallocation of water resources and come up with a recommended course of action; 11
- 12 Continue to develop more specific information about the instream and out-of-stream water supply benefits of groundwater/aquifer storage and recharge; 12
- 13 Work with the Washington Department of Fish and Wildlife, the Yakima Nation, and the Yakima Basin Fish and Wildlife Recovery Board to identify the most cost-effective specific salmon and steelhead recovery actions, including, but not limited to measures to improve flows in critical river and stream reaches. 13

It was appropriate for Ecology to decide not to include discussion of Columbia River off-channel storage, such as the Crab Creek dam proposal, in its state alternatives analysis. A decision on whether further study is warranted on the Crab Creek proposal will only be appropriate after more information is available on water demand in the Columbia basin at large, and after the information on potential water management tools other than large new surface storage dams catches up with what is already known about Crab Creek and other storage dam proposals. If the Black Rock/Yakima Storage Study process had gone forth in the way the larger Columbia River Water Management Program process is proceeding, we would have had a good handle on non-surface storage alternatives *before* a decision was made to go forward with an EIS/feasibility study focused (on the federal side) exclusively on expensive, environmentally risky new surface storage.

Reclamation's Planning Report/ EIS Comment Responses

III. <u>Black Rock Dam Poses Substantial Risk to the Health of the Columbia River</u>

The Black Rock dam proposal appears to pose a significant risk to water quality in the Columbia River and human health, as it threatens to speed the movement of contaminated groundwater plumes underneath the Hanford Nuclear Reservation toward the Columbia River. This could pollute the Columbia with dangerous contaminants, and it could pose problems for the current clean-up process at Hanford. The DEIS states: 14

> At present, it appears there could be impacts to deep vadose zone contamination at a minimum, and those remediation technologies and programs either currently implemented or under development at the Hanford Site could be *significantly impacted* by seepage from the Black Rock reservoir.

DEIS at 4-71 (emphasis added).

The DEIS notes that the U.S. Department of Energy (DOE) will be completing a study prior to the release of the final Yakima Storage Study EIS on the risks Black Rock reservoir would pose to the Columbia and the Hanford clean-up. As the Hanford groundwater contamination issue is one of the most important issues surrounding the Black Rock proposal, American Rivers requests a supplemental public comment period on the DOE study before the EIS is finalized.

While the Hanford groundwater issue is the most striking risk associated with the Black Rock proposal, it is not the only one with the potential to harm the Columbia River and its salmon. Other issues include (but are not necessarily limited to) impacts of the project on Columbia River flows during the spring and summer salmon migration season, impacts on dam operations and flows to protect fall chinook that spawn in the Hanford Reach, and false attraction for Yakima and/or upper Columbia salmon and steelhead populations. These issues should be addressed in the final EIS. 15

i. Effect on BiOp Flow Targets

With respect to flow, since summer flows are protected under RCW 90.90, we are primarily concerned with the effects of pumping from the Columbia to fill Black Rock in the spring. While the National Academy of Sciences noted in 2004 that summer flows are the most important to protect from biological perspective, migrating juvenile salmonids also depend on a substantial spring freshet to carry them out to sea. The biological opinions for the Federal Columbia River Power System (BiOp) have included separate spring and summer flow targets for over a decade. While summer flow targets are almost always missed, spring targets are also missed frequently, especially in late spring. Pumping to fill Black Rock is anticipated to draw 4.7 percent of the river's flow in June (DEIS at 4-109). This 16

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16

would make hitting BiOp flow targets that much harder, and could measurably slow the downstream migration of juvenile salmon and steelhead. Pumping in September also has the potential to harm already slow migration travel times for late-migrating Snake River fall chinook. Accordingly, these potential impacts should be evaluated in the final EIS.

ii. Hanford Reach Fall Chinook

17

Discussion in the DEIS of the potential effects of pumping to fill Black Rock reservoir on fall chinook that spawn in the Hanford Reach is inadequate. The DEIS asserts that operations will be within the constraints of existing operating agreements, but does not attempt to quantify how pumping from Priest Rapids pool would actually affect the health of the Hanford Reach fall chinook population. The final EIS should include that information.

iii. False Attraction

18

Regarding the issue of false attraction, there is some risk that both upper Columbia salmon and steelhead and Yakima salmon and steelhead could become confused about which river is which as they travel past (or to) the mouth of the Yakima. The DEIS indicates that there could be a particular risk of false attraction for the first generation of post-Black Rock fish returning to the Yakima, which might not recognize the Yakima as their home river. While the DEIS suggests that this issue would be resolved in successive generations as they acclimate to an altered chemical signature in the Yakima, the issue of how big the risk is to the first generation is not resolved in any detail (DEIS at 4-108). Since large impacts to one generation of fish impact future generations as well, the final EIS should be clearer about the magnitude of this risk.

IV. Economics/Cost

19

The benefit-cost ratios for all of the surface storage options considered in the DEIS fall below the standard for recommendation as a preferred alternative in a draft EIS. Factors other than economics can lead to a recommendation of a preferred alternative in a final EIS, but the economics on the surface storage projects discussed in the DEIS appear such that selecting any as a preferred alternative would be unwise and unsubstantiated.

While the Black Rock and Wymer proposals would provide some local economic benefits both during and after construction, the benefits to the federal and state taxpayers that would likely foot most of the bill for their construction falls well short of justifying their considerable expense – \$6.7 billion for Black Rock, and \$1.4 billion to \$5.9 billion for Wymer. In addition, some of the economic assumptions regarding new surface storage, such as the recreational value of reservoirs that will need to be drawn down dramatically in the summer to serve

Reclamation's Planning Report/ EIS Comment Responses

20

their water supply missions, are highly suspect. The final EIS should provide more detail on how the purported recreational benefits of the storage reservoirs will be affected by the need to operate the reservoirs for irrigation, or vice versa. More generally, it does not make sense for taxpayers to subsidize a new recreational resort of this magnitude, particularly given the associated environmental risk and the fact (not considered in the DEIS, though it should be in the final EIS) that the visitors the resort would draw would to some extent come at the expense of visitation to reservoirs and lakes with existing resorts elsewhere in the state and region, such as Lake Chelan and Crescent Bar.

Ecology's Comment Response Numbers in this Document

21

21

On the other hand, a package of alternatives including the State alternatives and targeted fish recovery actions may have the potential to deliver substantially more "bang for the buck" for communities, farms, and the river system. Such a package of alternative actions should be examined in the final EIS. An alternative package of actions should be evaluated not only in terms of its direct benefit-cost ratio, but should be balanced against the surface storage alternatives in light of opportunity cost. It would be worthwhile to see what could be accomplished if the nearly \$7 billion it would take to build and operate Black Rock dam were made available to improve municipal and agricultural water availability through other water supply and demand reduction tools, improve instream flows at least in key reaches, and fund other salmon recovery actions such as fish passage into currently inaccessible but nearly pristine headwaters habitat.

Thanks again for the opportunity to comment.

Sincerely,

Michael Garrity
Associate Director, Columbia Basin Programs

Comment Letter ORG-0006 – American Rivers – Michael Garrity

01 through 07	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
08	Additional information on the State Alternatives from the January 2008 Draft Planning Report/EIS has been provided in this Final EIS. As noted in Section S.7, Ecology anticipates that additional analysis will be conducted on these alternatives through future project level studies.
09	As noted in the Executive Summary of Reclamation's Final Planning Report/EIS and in Section 1.1 of this document, Ecology and Reclamation decided to complete separate SEPA and NEPA documents for the project and the State Alternatives were not included in the Reclamation's Final Planning Report/EIS. Ecology prepared the December 2008 Supplemental Draft EIS to analyze other salmon habitat and water management options. Additional analysis of the State Alternatives is provided in this Final EIS.
10	This Final EIS does not include additional analysis of potential municipal/domestic water conservation; however, Ecology anticipates that additional analysis could occur as part of the Integrated Water Resource Management implementation plan.
11	Reclamation and Ecology are organizing a Work Group to provide advise on implementation of the Integrated Water Resource Management Alternative, including the market-based reallocation of water resource element.
12	Some additional information has been added to Section 2.3.5 and Chapter 5 of this Final EIS regarding ground water storage. As noted in Section 2.3.5, Ecology anticipates that additional research will be conducted on the ground water storage alternative.
13	As described in Section 2.1, Ecology worked with tribal, federal and state water and fish and fish managers to develop the Integrated Water Resource Management Alternative which includes fish passage and fish habitat enhancement. Your comments regarding not including off-channel storage in the Columbia River basin in the Draft Planning/Report EIS are noted. Ecology agreed that further study was warranted.
14- through 20	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
21	This Final EIS presents an Integrated Water Resource Management Alternative that incorporates the State Alternatives from the January 2008 Draft Planning Report/EIS and the alternatives presented in the December 2008 Supplemental Draft EIS. The Integrated Water Resource Management Alternative is a package of actions intended to benefit fish recovery and water supply.

Comment ORG-0007

CLEAN, FLOWING WATERS FOR WASHINGTON

celp The Center for Environmental Law & Policy

March 31, 2008

David Kaumheimer
Environmental Programs Manager
U.S. Bureau of Reclamation
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Yakima, WA 98901-2058

Fax: (509) 454-5650
Email: storagestudy@pn.usbr.gov

Re: Yakima Storage Study, Draft Planning Report/Environmental Impact Statement

Dear Mr. Kaumheimer:

Thank you for the opportunity to provide comments on the Yakima Storage Study draft DEIS. These comments are submitted on behalf of the Center for Environmental Law & Policy, Columbia Riverkeeper, Citizens for a Clean Columbia (Wenatchee), Rosemere Neighborhood Association, Wahkiakum Friends of the River, Skippers for Clean Water, and Sierra Club.

Our comments are attached.

Yours very truly,

Rachel P Osborn

Rachael Paschal Osborn, Executive Director
Center for Environmental Law & Policy

and for:

Columbia Riverkeeper, Brent Foster, Executive Director
Citizens for a Clean Columbia (Wenatchee), Susan Evans, Executive Director
Rosemere Neighborhood Association, Dvija Bertish
Wahkiakum Friends of the River, George Exum, Chair
Skippers for Clean Water, Peter Wilcox, Executive Director
Sierra Club, John Osborn MD, Chair Upper Columbia River Group

Comments on Yakima River Basin Water Storage Feasibility Study, Draft Planning Report/Environmental Impact Statement (January 2008)

Submitted by Center for Environmental Law & Policy, Columbia Riverkeeper, Citizens for a Clean Columbia (Wenatchee), Rosemere Neighborhood Association, Wahkiakum Friends of the River, Skippers for Clean Water, and Sierra Club.

Reclamation's Planning Report/ EIS Comment Responses

1. Purpose & Need (Section 1.2)

01

The Bureau of Reclamation's limited review of alternatives to proposals involving dams & reservoirs improperly restricts consideration of other alternatives to satisfy the needs of the project, including non-structural and operational actions that could improve water supply and instream flows. However, the Joint No Action Alternative considers conservation pursuant to sections 1203 and 1204 of Title XII. Moreover, under the SEPA/state alternatives, the term "storage" and the objectives of the study are interpreted in a manner that encompasses a variety of non-structural activities relating to water supply.

It is inappropriate for the Bureau to separate analysis in this study conservation alternatives and other, ongoing studies. Given the critically low water supplies described in the DEIS and quoted above, it is a rather large oversight that conservation is not examined in more detail in the Joint Alternatives. The fact that declared droughts are occurring roughly every five years emphasizes the need for effective conservation measures. Likewise, the "Cle Elum and Bumping Lake Dams Fish Passage Facilities Planning Report," (discussed at Section 1.8.3), scheduled for completion later this year, should be incorporated into this effort. More extensive passage in the Yakima basin will considerably change the nature of water management potential.

02

2. Storage Study Goals

03

With respect to the Storage Study Goals (p. 1-3), the DEIS fails to provide information explaining the goal of achieving a 70% proratable supply (896,000 acre feet) for the basin. The goal to make this enormous quantity of water available creates an critical, perhaps unachievable benchmark, and should be thoroughly explained and vetted to determine whether alternative goals are more appropriate. Section 2.2.1.2 is inadequate to explain, other than that irrigation districts assert this is necessary to "avert major economic losses." However there is no discussion of how the term is defined or whether objective evidence indicates this is an appropriate figure. Do Yakima basin pro-ratable irrigators really require 896,000 additional acre-feet of water, and if so, why? The DEIS indicates that Sunnyside and Tieton divisions are not interested in receiving drought water. (Executive Summary, p. xxi). How do these statements affect the goal of 70%?

04

Likewise, the goal of 82,000 acre-feet for municipal supply admittedly does not include consideration of the potential for water conservation and pricing as a mechanism to control demand. Section 2.2.1.3. Further, there is no discussion of how the acre-feet requirements fit with recent municipal water conservation planning requirements and reasonable efficiency requirements for water rights.

3. Monthly Flow Objectives

In contrast to the out-of-stream water supply goals, the monthly instream flow objectives goal is based on a systematic, technical analysis of instream flow needs and how those needs relate to habitat requirements. We support the development and use of these objectives. However, we note that objectives for the Naches Arm, an important tributary of the Yakima basin, are missing. The technical process used to establish flow objectives for the DEIS should be utilized to analyze and project similar needs for the Naches subbasin. 05

4. No Action Alternative

The Bureau should select the No-Action Alternative (as described in Section 2.3) as its preferred alternative for the EIS. However, we note that the use of this alternative as "no-action" is problematic because it may lead readers to the incorrect assumption that the various activities (conservation plan implementation, land and water acquisitions, system improvements) are in fact funded and will in fact occur. (Indeed, the alternative contains a confusing mix of actions that have and have not occurred.) Setting these actions as the "baseline" then undercuts understanding of the substantial improvements in instream flow and water supply that could result if this alternative is actually and fully implemented. 06 Further, failure to conduct a benefit-cost analysis for the "no-action" alternative also limits full understanding by readers and decision makers of the comparative costs of the dam-reservoir alternatives to a conservation-oriented approach. 07

The No Action alternative is also deficient in its failure to discuss the merits of adjusting basin water demand to actual supply. Water rights in the Yakima were issued according to the exact tenets of the prior appropriation doctrine, that is, over-appropriation to ensure that all water is used during good years, with the assumption that junior water users will plant crops accordingly (ie, not plant perennial crops on lands that may not receive a full supply of water). A large, new storage reservoir would provide an "over-supply" of water to the basin, not needed in many (most) years, and therefore constitute substantial economic waste. Leaving the system as is, i.e., continuing to allow weather and markets to adjust demand, is not adequately explored in the DEIS. 08

5. Black Rock Alternative

The DEIS discussion of the Black Rock dam-reservoir alternative is inadequate for a number of reasons.

a) Hanford contamination

First, the DEIS fails to provide information about and analyze seepage of groundwater beneath the reservoir and the potential for harm to the cleanup of radioactive and toxic contaminants beneath the Hanford Nuclear Reservation. The DEIS instead defers to a future Department of Energy EIS and states that more information will be provided in the final Yakima Storage study EIS (p. 4-37, 4-71). This is a fatal flaw. The Bureau has the two studies necessary to model and determine impacts (the seepage report and the Hanford groundwater modeling report). The bureau also has the obligation, under NEPA, to address all significant adverse environmental impacts associated with a proposal. Leaving out this discussion frustrates the purposes of NEPA and renders this DEIS inadequate. 09

Second, even though the DEIS fails to discuss potential adverse impacts to Hanford, it includes discussion of mitigation concepts, presumably to assure readers that we are not to worry about the possibility of harming cleanup at one of (if not THE) most polluted sites in the United States (p. 4-39). This is an improper "cart before horse" approach to discussing impacts. 10

Third, the costs associated with the Bureau's alleged mitigation schemes for addressing seepage impacts on Hanford are not incorporated into the benefit-cost analysis for the Black Rock alternative (p. 4-39). Again, the DEIS is deficient for its lack of thorough discussion of impacts and costs associated with this critical environmental impact. 11

b) Geology

The Bureau's discussion of seismic and other geologic issues at the Black Rock site is both inaccurate and inadequate. The DEIS takes the view that any earthquake related hazard, or any other geologic hazard, will be dealt with during dam design and construction. This is not reasonable – it is impossible to engineer the proposed dams to withstand a hazard when the nature and degree of the hazard are unknown. Characterization of the geologic hazards must occur during the Storage Study process. Indeed, the preliminary geologic studies upon which the DEIS is based called for acknowledges that data is sparse and recommends that further studies be conducted. That recommendation has been ignored. The draft EIS is inadequate because it does not address the seismic hazards and other geologic hazards in enough detail to judge the seismic safety of the proposed dams, or to make rational planning decisions. 12

Attachment 1 to these comments and incorporated by reference are the comments of seismic geologist Harold Magistrale, Ph.D., regarding the seismic and other geologic hazards associated with the Black Rock damsite.

6. Wymer Dam and Wymer Plus Alternative

The Bureau's discussion of seismic and other geologic issues at the Wymer Dam site is both inaccurate and inadequate. The DEIS takes the view that any earthquake related hazard, or any other geologic hazard, will be dealt with during dam design and construction. This is not reasonable – it is impossible to engineer the proposed dams to withstand a hazard when the nature and degree of the hazard are unknown. Characterization of the geologic hazards must occur during the Storage Study process. Indeed, the preliminary geologic studies upon which the DEIS is based called for acknowledges that data is sparse and recommends that further studies be conducted. That recommendation has been ignored. The draft EIS is inadequate because it does not address the seismic and landslide hazards in enough detail to judge the seismic safety of the proposed dams, or to make rational planning decisions. 13

Attachment 1 to these comments and incorporated by reference are the comments of seismic geologist Harold Magistrale, Ph.D., regarding the seismic and other geologic hazards associated with the Wymer damsite.

7. Cumulative Impacts

In Section 4.2.2.6, the difference between the discussion of the cumulative effects associated with the Columbia River Water Management Program (CRWMP) (one paragraph) and climate change scenarios (13 pages) is striking. Yet we can say CRWMP is likely to affect surface flows in the Columbia River with much greater certainty than we can predict regional future climate (temperature and precipitation changes). The DEIS is deficient for its failure to discuss cumulative impacts associated with various CRWMP projects as they will affect Columbia River flows, including the Lake Roosevelt drawdown, the Potholes Supplemental Feedroute, and the Columbia Mainstem Offchannel dam-reservoir projects (Lower Crab, Sand Hollow and Hawk Creeks). Detailed information is available regarding 14

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each of these projects, including draft and/or final environmental impact statements (SEPA and NEPA driven), appraisal studies, etc. This problem is again repeated in Section 4.4.2.7, which discusses cumulative impacts on hydropower, but fails to discuss the multiple proposed projects that would both require substantial energy resources for pumping, and would remove water from the Columbia River, resulting in net reduction of hydropower production. 14

The DEIS cumulative impacts analysis fails to identify or address the effects of the proliferation of exempt wells in the already over-appropriated Yakima River Basin. A legislative exemption currently allows unmetered groundwater withdrawals without a permit. Due to the absence of unallocated water in the basin, and the unavailability of water rights for purchase, the legislative exemption has become the rule, rather than the exception, for new residential developments. During 2007 land owners dramatically increased the use of the exemption to support new construction in developments without a water right. Based on 2008 projections, the use of the exemption continues increase at an alarming rate. Unless Ecology quantifies the withdrawals associated with the exemption, and develops mitigation measures to offset future uses, exempt well users may withdraw water in quantities that have a significant impact on surface water flows. 15

Furthermore, the Growth Management Act mandates that certain counties establish a comprehensive plan and development regulations that protect both the quantity and quality of water resources within the county. The Yakima basin counties affected by this DEIS have failed to comply with this mandate. Continued development without controls and mitigation measures on the use of exempt wells threaten water quality and quantity. Until the Counties have developed comprehensive plans that comply with the GMA, neither Reclamation nor Ecology can project future water demand requirements and impacts.

8. Hydraulic Modeling Omission

The DEIS is inadequate fails to incorporate information and results from the hydraulic modeling (Yakima River Water Management Study, created by Ken Bovee of the U.S. Geological Survey) examining the relationship between flow and habitat parameters that was done as a component of this very study. As noted on the USGS website: "This study will develop an integrated water management/habitat response tool that will allow land managers to quantify the feasibility, effectiveness, and risks associated with various water management alternatives." How the Bureau could issue a DEIS without including the modeling results is entirely unclear. 16

We would note that CELP asked for but was denied request to extend the deadline for comments and is unable to provide more information about the Water Management Study, which was released less than one week before the DEIS comment deadline.

9. Benefit-Costs

We support the Bureau's NED benefit-costs analysis associated with the joint alternatives (Section 2.7) but wonder to what extent the expenses associated with complicated institutional arrangements (such as described in Section 2.2.5.3, "Effects of Exchange on Yakima River Basin Water Rights") are incorporated into the estimates of costs provided to date. Also, the failure to assess the costs associated with the substantial mitigation scenarios (i.e., to prevent seepage of groundwater to Hanford or replacement of 3,900 acres of shrub-steppe habitat) leaves the reader unable to assess the actual costs 17

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associated with the Black Rock and Wymer alternatives. In this respect the DEIS is inadequate. 17

We concur in the statements in the DEIS that the Black Rock, Wymer Dam, and Wymer Plus alternatives are "not economically justified." (Section 2.7.1)

Regarding cost of municipal water supply, it is clear that it would be much cheaper to simply purchase water rights for transfer to the cities requiring additional supply to meet future demand. This appears to be the contemplated solution under the "no action alternative," however the DEIS does not make this clear. 18

Regarding the recreation benefit analysis, the DEIS is deficient for failure to quantify site substitution for use at recreational sites outside the Yakima basin, and instead simply note that the recreation benefits may be overstated (p. 2-85). 19

We support the Bureau's decision to not include non-use fishery values in the BCA (p. 2-100), given the controversy and difficulty in measuring such values for fisheries in the Yakima basin.

10. Hydrology & Biology

Discussion of hydrology and streamflow issues (from a biological standpoint), occur throughout the document. The DEIS Purpose and Need section states in part:

> "The need for the study is based on the finite existing water supply and limited storage capability of the Yakima River basin. This finite supply and limited storage capability does not meet the water supply demands in all years and results in significant adverse impacts to the Yakima River basin's economy, which is agriculture-based, and to the basin's aquatic resources—specifically those resources supporting anadromous fish. Reclamation and Ecology seek to identify means of increasing water supplies available for purposes of improving anadromous fish habitat and meeting irrigation and future municipal needs."

While true, this statement ignores the fact that the Columbia River is limited by the same phenomena. Two alternatives propose transfer of water from the Columbia to the Yakima. Although this transfer would occur when minimum instream flow requirements for the Columbia are exceeded, this would merely exacerbate one problem to alleviate another. 20

The DEIS uses target flows established by NOAA Fisheries for the Federal Columbia River Power System's 2004 biological opinion. Not mentioned, is the fact that the 2004 biological opinion was the result of a federal court requirement to revise a 2000 biological opinion that the court deemed inadequate in addressing salmonid recovery. Target flows from the 2004 biological opinion should be considered moving targets in that the 2004 biological opinion has been challenged and remains in court. The DEIS is inadequate for its failure to consider potential changes to Columbia flow targets that may alter water availability for the Black Rock and Wymer Plus alternatives. 21

The requirements of the Endangered Species Act and the agencies charged with administering it are not adequately addressed in the DEIS. For example, the DEIS includes an attachment, Section IV, which reports and responds to comments of the USFWS, but contains no mention of solicitation of comments on anadromous fish issues from NOAA 22

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Fisheries. In the realm of aquatic resources, status of anadromous fish stocks must receive priority in the Yakima basin. Lack of substantive solicitation of NOAA Fisheries review is magnified by the top priority listed by USFWS, potential loss shrub-steppe habitat. 22

The "hydrologic indicators" outlined in Tables 2-7 and 2-8 (No Action Alternative), Table 2-26 (Black Rock Alternative), Table 2-37 (Wymer Alternative), Table 2-46 (Wymer Plus Alternative) are presented in units of millions of acre-feet. A much more appropriate indicator of changes to hydrology would be presented in terms of flow. From a biological perspective, changes in velocity throughout the system would also be informative. The volumes presented are more of a commodity than a hydrologic indicator. Likewise, presenting "hydrographs" in terms of volume, rather than flow, makes biological analysis more difficult than necessary. These units for hydrologic indicators are repeated in the State Alternatives analysis (Chapter 5). These indicators might be more accurately termed "Irrigation Adequacy Indicators." 23

Furthermore, the salmonid species included in the DEIS require certain velocities, in addition to flow, more than simply a volume of water. Ultimately, though, flow objectives for fish should be determined in the absence of irrigation needs and then a compromise sought. Even some of the methods described for flow modeling (Section 4.8.2.1) rely on volumes, rather than flow or velocity.

The hydrograph that is presented (Figures 2.2 – 2.7) definitively shows that none of the alternatives remotely approximates unregulated flow. Comparison of alternatives with mandated target volumes in no way indicates the benefits or detriments of the alternatives to biological communities. However, it is later stated (Section 4.10.2.3) that the Black Rock alternative results in the most "normative/unregulated" flow regime. 24

Given the severely altered hydrographs in the Yakima, additional withdrawal and storage, as presented in the Wymer alternative, appears to be a poor method by which to increase the health of fish populations. The reasons for the "flip-flop" are described but its effectiveness is not. Alternative flow management regimes should be examined to encourage spawning. The Joint Alternatives sections make several mentions of improvements to water delivery infrastructure including reregulating dams. These are not described but reregulating dams may have substantial positive effects on efforts to re-establish normative flows. Re-regulating dams may also reduce impacts to a variety of systems currently experienced under the flip-flop regime. 25 26

The report describes, in some detail, the necessity of unregulated flows for anadromous fish habitat (Section 4.8.1.3) but ignores the responsibility of agencies, and the public in general, to restore these flows and dependent resources. The No Action Alternative results in a number of Title VII target flows being met (Tables 5.6-7). This speaks to the questionable necessity of drastic infrastructure construction. It does not, however, speak to the necessity, to native salmonid recovery, of restoration of normative flows. 27

The statement that "fisheries habitat conditions have significantly changed through decades of development, both within the Yakima basin and downstream, that preclude achieving near historic anadromous fish populations through actions provided by the Joint Alternatives or any other suite of realistic actions (page 4-118)" is short-sighted and ignores current efforts to accomplish exactly the recovery that Reclamation claims unrealistic. And, indeed, when referencing the Yakima Subbasin Plan, the DEIS describes substantial potential increases in andadromous fish populations. 28

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Ultimately, there is more treatment of fish habitat in the presentation of dismissed alternatives. This, however, amounts to mere mention of impacts to fish habitat. The assumption, in the analysis of Fisheries Benefits, that a fish closed to harvest has "little to no fishery use value" is wholly flawed and inappropriate to an analysis of fisheries impacts. The DEIS mentions that the Yakima is considered a "blue ribbon" trout stream. The fishermen that recognize this often practice catch-and-release fishing, whether harvest is allowed or not. 29

The Bureau's report on fish habitat (Aquatic Ecosystem Evaluation for the Yakima Basin, USBR, 2008) starkly reports the declines in available anadromous salmonid habitat under the DEIS Alternatives. Loss in available habitat ranges from about 20% decrease to negligible increase, depending on species, life history species, reach and alternative. The unregulated condition routinely results in substantial increases in available habitat, quite often a 20%-40% increase in habitat, depending on species, life history stage, reach and alternative. In the case of subyearling bull trout (a federally listed threatened species) and coho the amount of available habitat nearly doubles in the unregulated condition. 30

Incidentally, this same report claims substantial increases in "performance" under all alternatives relative to the no action alternative. Performance is "expressed in terms of equilibrium abundance, productivity (maximum adult returns/spawner), carrying capacity and life history diversity (proportion of self-sustaining life history patterns)." These claims contradict other, more conventional metrics, of fish biology which are described in the DEIS.

On page 4-152, the DEIS notes that bull trout typically spawn between September and November. However, the DEIS also makes reference to a study reporting that bull trout spawn between July 15 and September 15. This is a much earlier spawning period than typically applied to bull trout spawning. In the treatment of bull trout in the Affected Environment chapter, this referenced study is not mentioned. Reclamation should be clear about the local biology of this highly sensitive, ESA listed species and the effects of proposed actions on its life history. The Chelan PUD reports bull trout spawning in the Entiat to occur in mid- to late-September (Movement of Bull Trout Within the Mid-Columbia River and Tributaries, 2001-2004, BioAnalysts, Inc., 2004). 31

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32 The increased flows provided by the Increased Conservation Alternative (Section 5.8) suggest serious examination of this alternative during development of the Final EIS. This alternative has the advantage of a minimal construction footprint compared to the Joint Alternatives. As mentioned above, it is not clear in the DEIS if, and how, Title XII or the 1945 Consent Decree limit the Bureau's ability to pursue the Increased Conservation Alternative jointly. 32

Washington's newly approved water quality standards apply a period of September 1 to May 15 for Char Spawning and Rearing in the Lower Yakima (WRIA 37), and Naches (WRIA 38) basins (Waters Requiring Supplemental Spawning and Incubation Protection For Salmonid Species, Publication Number 06-10-038, 2006). Char Spawning and Rearing is also a protected designated use in the Upper Yakima (WRIA 39) (Chapter 173-201A-602 (Table 602)). Over the course of several years, considerable professional and public comment went into development of the new water quality standards. 33

Section 4.6.1.2 states that Washington has no water quality criteria for phosphorus. WAC 173-201A-230 establishes phosphorus criteria for lakes. Some of this language may be applicable to reservoirs in the Yakima basin. 34

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11. Wildlife Impacts

The DEIS does not provide adequate discussion of the value of Black Rock Valley as a wildlife corridor. 35

12. Anadromous Fish Impacts

The DEIS discussion of impacts on flow and salmon survival should incorporate information from several other studies, including Forward Looking Infrared (FLIR) surveys of surface water temperature, showing hyporheic influence, that have been conducted for the Yakima basin and the Yakima Watershed Salmonid Recovery Strategy, which identifies many of the parameters defined in the DEIS as limiting factors to salmonid recovery (flow, flashiness, sediment, temperature, hyporheic discontinuity). The DEIS includes details about the U.S. Fish and Wildlife Service (FWS) recommendations and the Bureau of Reclamations (BOR) responses. There is no such coverage of any concerns of NOAA Fisheries. An additional such an attachment seems necessary to fully document effects of alternatives on anadromous fish. 36

13. Recreation Impacts

The recreation impact analysis lacks adequate discussion of the impacts related to Black Rock and Wymer reservoir drawdown. The limited discussion of this important issue and is deficient for failure to include maps (which are available) that indicate exposed lands within the reservoirs that will deter recreational use. The suggestion that drawdown would provide a benefit to ATV and OHV use is absurd (p. 4-178). 37

There is also tremendous inconsistency in the treatment of this impact and impacts to wildlife and endangered species at the Black Rock site, where mitigation would involve creating corridors to protect what little habitat would be left. (See Section 4.11.2.6). 38

The DEIS comparison of Black Rock to other, nearby water bodies where there is minimal recreational use, indicates that the projected recreational benefit (based on 250,000 to 700,000 annual visits) is substantially over-stated (annual visits to other reservoirs and rivers in the Yakima basin not equate, in total, to 250,000 annual visits, se Table 4.36, p. 4-175). 39

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14. State Alternatives Generally

40 SEPA regulations require the Alternatives section of an EIS to "devote sufficiently detailed analysis to each reasonable alternative to permit a comparative evaluation of the alternatives including the proposed action." WAC 197-11-400(5)(c)(v). Chapter 2, the State Alternatives section, fails to provide sufficiently detailed analysis. It is unclear how water savings were determined, how they will be paid for, and how they will be implemented. 40

CELP generally agrees that water conservation and market alternatives are preferable to expensive (unaffordable) storage proposals. However, the information regarding these alternatives does not meet SEPA requirements and provides an insufficient level of data or analysis to be properly analyzed.

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41 The State Alternatives are also deficient for failure to analyze how water pricing could reduce demand and induce water conservation sufficient to solve water supply and instream flow problems in the Yakima basin. The DEIS should inform readers about the level of subsidy involved in delivery of Yakima basin water to irrigators, and the extent to which a change in pricing structures, imposition of water fees (particularly during drought years) or other similar market-based mechanisms would meet the goals of the study. 41

15. Enhanced Water Conservation (Section 3.2)

(1) General Comments

42 The State Alternative, Enhanced Water Conservation (EWC), is vague, unsubstantiated, and/or based on too many assumptions. Alternatives in a SEPA analysis must be sufficiently defined so that the public and agency can base decisions upon informed deliberation. The EWC alternative does not provide the level of detail necessary for the reader to fully appreciate how the alternative offers solutions different than those of the storage alternatives. This lack of sufficient information violates SEPA regulations. WAC 197-11-400(3). 42

43 Further, the EWC alternative fails to consider tools already in Ecology's portfolio that could have a dramatic impact on water conservation. These tools are enforcement of illegal water use and metering. The state should analyze the amount of water conservation to be realized through enforcement of existing laws. Moreover, lacking adequate metering data, the amount of conserved water as a result of the enhanced conservation measures will not be accurate. Accuracy of water resource data is important in any basin, but it is vital in the Yakima basin due to over appropriation and the adjudication of the basin. The fact that metering is not included in the study of alternatives speaks to the inadequacy of the overall analysis. 43

(2) Specific Comments

Section 3.1.2 Summary of Alternative Results

44
- The summary claims the Enhanced Conservation Alternative will increase instream flows in the Yakima River by 40,000 acre-feet on average and would provide 20,000 acre-feet for proratable water right holders.
  - However, the analysis fails to explain how it determined these figures.
  - The sections that follow discuss the types of conservation projects and compares them to the No Action Alternative, but nowhere in the report is the analysis showing how implementing the Enhanced Conservation Alternative will increase instream flows by 40,000 acre-feet. 44
- This cursory and insufficient analysis plagues this chapter from start to finish and points out the inefficacy of this document to meet SEPA requirements.

Section 3.2.1 Description

45
- The Plan states most of the water saved as a result of enhanced water conservation will involve nonconsumptive uses including seepage and return flows. Since only the consumptive portion of a water right can be transferred or reallocated within the Yakima Basin this alternative may actually increase stream depletion in certain reaches. The section notes, "the Yakima Project has some flexibility in its operation and can allow some redistribution of water 45

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45 within the basin." However, this statement is not further explained and as such it is unclear as to how valuable EWC will be to the overall basin. 45

Section 3.2.2 Enhanced Water Conservation Projects

46

- The estimated amount of "conserved" water as a result of the various enhanced conservation projects is presented without any discussion of how these totals were specifically determined. 46
- The accompanying technical document, *Technical Report on the Enhanced Water Conservation Alternative for the Yakima River Basin Water Storage Feasibility Study*, also does not provide any information on how these savings were calculated.
    - The Technical Report claims the water savings "were determined using information available form water conservation plans and experience of representatives from the local conservation districts."
    - However, no actual data is presented for the public to determine or analyze the assumptions and "experience" of the conservation districts.
    - Therefore, the results of the Enhanced Water Conservation Measures are too vague and unsubstantiated to have any value in a SEPA determination.
- Conserved water can best, and really only, be measured via technically sound metering devices. Source and service meters must be installed in order to correctly determine any water savings as a result of the water conservation projects.

Section 3.2.3 Comparison to the No Action Alternative

- The introduction to the State Alternatives notes, "This chapter describes the alternatives that Ecology is considering under its authority to evaluate both storage and nonstorage alternatives to *improve flows* in the Yakima River basin."
    - 47 However, one option under Section 3.2.3 is to allow all the conserved water to be retained by the implementing entity for use as irrigation or municipal and industrial use. 47
    - Ecology must explain how this alternative would meet the goal of improving flows in the Yakima River basin.
- 48 If Ecology is going to have an alternative that allows full retention of conserved water by the implementing entity it should also have an alternative that returns all of the saved water to the river for instream flow. 48
- Ecology assumes at least 67% of the funding for these projects will come from the State, yet the other option still allows for the implementing entity to retain 67% of the conserved water.
    - 49 Since public money is being spent, Ecology should focus on achieving a greater public benefit 49
    - 50 Another alternative should be included that keeps 67% of the conserved water for instream flow needs and the other third for implementing entity. 50
- The Enhanced Water Conservation Alternative assumes 67% of its funding will come from the State.
    - 51 This assumption is unsupported by any budgetary analysis. As such it cannot be considered a valid assumption particularly when the State is perhaps facing a future of budget deficits. 51
    - Ecology offers no alternative to funding these conservation measures.

16. Market Mechanisms (Section 3.3)

52 As noted above, this proposal should be expanded to include information relating to the of subsidy that is afforded to water recipients in the Yakima basin and consider the efficacy of 52

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52 regulatory pricing requirements, such as drought-related fees or other mechanisms to reduce water demand and induce water conservation. 52

As presently written, the information contained in this section is so vague that it is not useful for determining the impacts associated with the proposed actions.

17. Groundwater Storage (Section 3.4)

53 Although the description of the injection recharge alternative does address the need to insure the quality of the water injected into the aquifers, it fails to discuss the impacts of additional water treatment facilities on the basin as a whole. Active water treatment methods will increase the financial and energy related costs associated with this alternative. Without a quantification of these increased costs, Reclamation and Ecology cannot accurately weigh this alternative against the others. 53

54 Both the Surface Recharge with Passive Recovery and the Injection Recharge with Passive and Active Recovery methods discuss Potential Locations. However, the DEIS fails to identify specific locations for municipal aquifer storage and recovery or Surface Recharge with Passive Recovery. Instead the DEIS puts off the determination of locations until the alternative is selected. Without more specific information on the possible storage sites, the effects of this alternative are unquantifiable. 54

18. Mitigation

55 The discussion of mitigation requirements contained in Chapters 4 and 5 are vague and too generalized to meet the requirements of SEPA. See, e.g., Sections 4.3.2.6 (groundwater impacts), 4.6.2.6 (water quality); 4.7.2.6 (vegetation and wildlife); 4.8.2.7 (anadromous fish); 4.9.2.7 (resident fish); 4.11.2.6 (threatened and endangered species). 55

The statement that mitigation is not required for surface water or hydropower impacts does not comport with SEPA, which requires mitigation for all significant adverse environmental impacts. See e.g., 4.2.2.5 (surface water); 4.4.2.6 (hydropower).

Review of the Black Rock and Wymer Dam Sites Geology as Presented in the
Draft Planning Report/Environmental Impact Statement
Yakima River Basin Water Storage Feasibility Study

Harold Magistrale, Ph.D., J.D.

1. Scope of the review.

This review discusses geologic aspects of the Black Rock and Wymer dam sites as presented in the Draft Planning Report/Environmental Impact Statement Yakima River Basin Water Storage Feasibility Study ('draft EIS') and in the following documents:

- Technical Memorandum No. D-8330-2004-14, *Probabilistic Seismic Hazard Assessment for Appraisal Studies of the Proposed Black Rock Dam* (Reclamation, 2004) ('PSHA study')
- Technical Series No. TS-YSS-5, *Appraisal Assessment of the Geology at a Potential Black Rock Damsite* (Reclamation, 2004) ('Black Rock report').
- Technical Series No. TS-YSS-16, *Yakima River Basin Storage Study Wymer Dam and Reservoir Appraisal Report* (Reclamation, 2007) ('Wymer report').

This review was prepared at the request of the Center for Environmental Law and Policy, an environmental advocacy organization dedicated to the protection of water resources in the Columbia River Basin, and throughout Washington. It was prepared by Harold Magistrale, a California attorney with a Ph.D. in geophysics from the California Institute of Technology, and twenty years of earthquake research experience.

2. Executive Summary

The proposed Black Rock and Wymer dam sites are in the Yakima Fold Belt of east central Washington, a region characterized by folds in the Columbia River basalts. The folds form topographically high ridges that define the impoundment catchments desired for the proposed reservoirs. The folds are formed by earthquake slip on thrust faults (a dipping fault where older rock layers are displaced over younger rocks) within each fold. The Black Rock and Wymer dams, along with appurtenant structures, are to be built on and near these faults. The south abutment of the Black Rock dam is atop a fault. Another fault lies one kilometer west of the Wymer fault. Water conveyance facilities will also cross these faults.

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Potential earthquakes on the faults will have effects on the proposed dams:

- Ground shaking. A preliminary study estimates the strength of the shaking at 1 g horizontal acceleration (1 g is the acceleration equal to the Earth's gravitation force). The duration of the potential shaking is unknown. 56
- Liquefaction. Ground shaking can trigger liquefaction, a type of soil failure that reduces soil strength to zero; this will undermine engineered structures.
- Surface rupture. The displacement of the fault at the ground surface will offset the dam and water conveyance structures.
- Fold growth. The dam abutments are on the folds, and earthquakes are the mechanism by which the folds are formed and grow. During an earthquake, the 57

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entire dam abutment will be deformed and the dam compressed. This effect is not considered in the draft EIS. 57

- Reservoir induced seismicity ('RIS'). It is commonly observed that the filling of a reservoir can cause earthquakes. The mechanism is thought to be the reservoir head elevating pore pressure and/or lubricating the fault, or the stress perturbation due to the weight of the reservoir. These earthquakes will cause the same effects as natural earthquakes. The draft EIS completely neglects RIS. 58
- Landslides. The dam sites are prone to landslides because of the steep topography and the presence of weak layers in the bedrock. Earthquake ground shaking can reactivate old landslides, or trigger new ones in currently stable slopes. Also, the impounded water will saturate the slopes surrounding the reservoirs. The saturation can remobilize old landslides and cause new landslides in currently stable slopes.
- A landslide has been tentatively identified at the south abutment of the Wymer dam site, but the draft EIS dismisses its significance on the basis of a cursory inspection. Other existing landslides have been identified upslope from the proposed Black Rock reservoir. A landslide runout into a filled reservoir would displace the impounded water with severe consequences. 59

Unfortunately, the faults near the dam sites are poorly characterized. The fault slip rates, time between earthquakes, magnitude of potential earthquakes, and the strength and duration of shaking from potential earthquakes are not known. Landslide potential of the slopes around the reservoir sites is scarcely known. The extent and distribution of liquefiable soils is not known. 60

The preliminary studies (the PSHA study, the Black Rock report, and the Wymer report) recognized the lack of knowledge of the geologic hazards, and all called for further studies to better characterize the hazards. None of those studies has been conducted. 61

The draft EIS has the view that any earthquake related hazard, or any other geologic hazard, will be dealt with during dam design and construction. This is not reasonable – it is impossible to engineer the proposed dams to withstand a hazard when the nature and degree of the hazard are unknown. Characterization of the geologic hazards must occur during the Storage Study process. The draft EIS is inadequate because it does not address the seismic hazards and other geologic hazards in enough detail to judge the seismic safety of the proposed dams, or to make rational planning decisions. 62

3. Specific Comments

<u>Section 2.2.2.1 "Black Rock Damsite Seismicity", Paragraphs 1 and 3</u>

The seismic hazard analysis in the draft EIS comes from the PSHA study. The draft EIS claims the PSHA study "documents the preliminary characterization of the earthquake potential at Black Rock dam site." To characterizer the "earthquake potential" would be to characterize the likelihood of timing and magnitude of future earthquakes based on detailed studies of the timing and magnitude of past earthquakes on nearby 63

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faults. Instead, the PSHA study uses sparse existing data to assume a time and space distribution of earthquakes on local and some distant faults, and calculates the likelihood over a period of time of a particular level of ground motion, the peak horizontal acceleration ('PHA') at the dam site. The PSHA study correctly points out that there are only "little or sparse data" to characterize recent earthquake activity (p. 5). 63

The PSHA results are assumption driven. For example, it is well known that the maximum earthquake a fault is capable of is a function of fault length (Wells and Coppersmith, 1994). The Black Rock Valley fault is under the right (south) abutment of the Black Rock dam. The PSHA study assigns a rupture length of 38 km to the Black Rock Valley fault, with a maximum magnitude of 6.7 (Table 2.2). However, the "Black Rock Valley fault" is actually part of the Rattlesnake Hills structure shown on a recent USGS fault map (see Figure 1), a fault and fold structure with a cumulative length of over 150 km (Lidke *et al.*, 2003). The PSHA study treats the Rattlesnake Hills structure as three separate fault segments, each with a certain maximum magnitude controlled by the segment length. However, there is little evidence to characterize the segmentation of the Rattlesnake Hills fault structure (PSHA study, p. 5). If the entire fault structure ruptured, a much larger earthquake would result, with a larger PHA. 64

The PSHA study emphasizes that it is "an initial Probabilistic Seismic Hazard Assessment … conducted for use in *appraisal-level* studies of the proposed Black Rock Dam." (p. 1) (emphasis added). The PHSA study correctly calls for further study on the age and characteristics of the Black Rock Valley fault under the right abutment of the dam (p. 18). These studies have not been performed. The generalized nature of the PSHA, based on incomplete characterization of the faults at issue, is not adequate. An adequate EIS must include up to date study results of the fault slip rate, average offset, and recurrence interval. 65

The PSHA study correctly calls for "more complete descriptions of ground motions parameters, including time histories" (p. 18-19). This is in recognition that simple peak amplitudes of ground motion are an inadequate basis for rational engineering and hazard evaluation decisions, and that the duration of the ground motions must be characterized. Such studies are not addressed in the draft EIS. Further, the PSHA study correctly points out that ground motions will be "greatly influenced" by rupture directivity and hanging wall effects (p. 19). Characterization of these factors has not been performed in the draft EIS. 66

The PSHA study correctly calls for studies of site response (the influence of near surface materials) on earthquake ground motions (p. 19). Site response has long been recognized at having a critical influence on earthquake ground motions (*e.g.*, Milne, 1898). Such studies have not been performed, and are not addressed in the draft EIS. 67

The PSHA study correctly calls for baseline studies of RIS (p. 19). Such studies have not been performed, and are not addressed in the draft EIS. We address RIS in our comments below. 68

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The calls for more study of the fault are echoed in the 2004 Black Rock report. That report states "The location and geometry of the thrust fault in the right abutment are not well known. Additional investigations are needed to define geometry, slip rates, movement history, and earthquake potential. The investigations will likely require both drilling and trenching" (p. 24). Now, at the time of the draft EIS three and half years later, these necessary studies have not been performed. (Note that in the Black Rock report the fault under the right abutment is called the Horsethief Mountain thrust fault, while in the draft EIS it is called the Black Rock Valley fault.) 69

The PSHA study properly attempts to include the influence of very large earthquakes in the Cascadia subduction zone on the PHA at the Black Rock dam site. It should be acknowledged, however, that the attenuation functions used in the study (which are based on previously observed ground motions, mostly in California) are likely to be inadequate at the magnitude 8 to 9 range because of the lack of observations of earthquakes of those magnitudes (Youngs *et al.*, 1997). 70

Section 2.2.2.1 "Black Rock Damsite Seismicity", Paragraph 2

Liquefaction due to earthquake shaking is identified as a concern in the dam materials and foundation area. However, liquefaction is also a concern away from the dam; it has potential effects on ancillary structures such as pipelines, canals, and roadways. Unfortunately, the draft EIS does not identify the extent of potentially liquefiable soils. The EIS should include a detailed soil map with liquefaction potential estimates. This is particularly important because of the anticipated seepage from the reservoir – the seepage may saturate otherwise competent soils downgradient of the reservoir, increasing the liquefaction potential. 71

Section 2.2.2.1 "Black Rock Damsite Seismicity", Paragraphs 3 and 4

The fold on Horsethief Mountain is associated with the Black Rock Valley thrust fault that surfaces under the south abutment. During an earthquake on the Black Rock Valley fault, the fold grows via northward movement of the rock above the fault (*e.g.*, Suppe, 1985). Thus, during an earthquake, the entire south abutment of the dam will move an unknown amount to the north. (The amount of movement is unknown because the draft EIS has failed to characterize the history of slip per earthquake on the Black Rock Valley fault.) This will cause deformation of the dam with potentially serious consequences. A rational assessment of the dam's response to an earthquake on the Black Rock Valley fault requires an adequate characterization of the past earthquakes on the fault. Such a characterization is absent from the draft EIS. 72

Section 2.2.2.1 "Black Rock Damsite Seismicity", Paragraph 5

In summary, the draft EIS ignores all the caveats of the preliminary nature of the PSHA study, and the proponents have failed to perform any of the PSHA study's recommendations for additional work to more accurately characterize anticipated strong ground motions from potential future earthquakes. Merely asserting the dams will be designed to handle earthquake ground motions, without sufficient characterization of the causative faults, consideration of the abutment deformation, or extent of potential liquefaction, is inadequate. It is impossible to design and engineer the dams to withstand 73

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earthquakes without an adequate understanding of the nature and degree of the earthquake hazards. 73

Note that earthquake shaking will affect all appurtenant structures in addition to the dam structures, including water conveyance systems, seepage control systems, service roads, and slope stability (landslides).

Section 2.2.2.2 "Wymer Damsite Seismicity"

No site-specific seismic hazard evaluation was performed for the Wymer dam site. The ground motion considerations are taken from the PSHA study performed for the Black Rock dam site, and much of the discussion in Section 2.2.2.2 was taken from Section 2.2.2.1. We express all the same concerns about the Wymer site as we do for the Black Rock site. 74

In regards to concerns of fault rupture within the project area, the draft EIS states "Based on the limited preliminary geologic characterization of the site, there is no evidence to indicate that a potentially active fault exists within the dam, dike, or reservoir area." However, "relatively little exploration has been conducted to date, and further investigations could conceivably find evidence of foundation faulting." A rational assessment of the merits of the dam requires more detailed knowledge on the presence of faults in and near the dam site. The draft EIS is inadequate in this respect. 75

A cursory examination of the USGS fault map (Figure 1) shows that the Umtanum Ridge – Gable Mountain Structure, a 200 km long fault and fold system, runs only a kilometer to the west of the dam site, just across Highway 821 (Lidke *et al.*, 2003). The PSHA study included this fault system in its assessment of the Black Rock Valley site PHA. The failure of the draft EIS here to note the proximity of this major fault to the Wymer dam site renders the draft EIS inadequate, and does not build confidence in the seismic hazard evaluation process. 76

The most common orientation of the faults and folds in the Yakima Fold Belt is east–west, but the Umtanum Ridge – Gable Mountain Structure strikes northwest–southeast near the Wymer dam site (Figure 1; Reidel *et al.*, 2003). This part of the fault structure may be associated with the Olympic-Wallowa lineament, an alignment of faults and folds that may represent a fundamental, crustal scale discontinuity (*e.g.*, Reidel *et al.*, 1994). The different orientation of the Umtanum Ridge – Gable Mountain Structure near the dam site, and its possible association with the Olympic-Wallowa lineament, suggests the fault near the dam site may respond to the regional stress differently than the faults near the Black Rock Valley site (*e.g.*, with different recurrence times or different size earthquakes). This suggests that an independent seismotectonic analysis of the Wymer dam site must be performed before the EIS can be considered adequate. 77

Section 2.2.2.3 "Wymer Dam Potential South Abutment Landslide"

The Wymer report describes the previous identification from air photos of a potential landslide covering the area of the south (left) abutment (p. 7). On the basis of a few hours-long visit to the site (Wymer report, Appendix A), a reconnaissance team decided that the "landslide does not appear to be a deep landslide" (Wymer report, Attachment 78

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2). The rationale for this assessment is not given in either the draft EIS or in the Wymer report. The draft EIS concludes that a "limited amount of geologic investigations at the appraisal stage found no evidence of a large landslide" at the south abutment of the Wymer dam site, but that if one existed then the unstable material would be excavated away. 78

An air photo of the south abutment (Figure 8 of the Wymer report) exhibits features indicative of a landslide (*e.g.*, Ritter *et al.*, 2002). At the top of the apparent landslide there are arcurate features that appear to be headscarps, and on the slope downhill from those arcurate features the hillside lacks the bedrock outcrops that are common on the slopes just to the east and west. The potential landslide has not been investigated by drilling; only a five feet deep, hand dug pit was excavated (TP-85-1 in the Wymer report).

It would be sensible, from both a cost analysis and geologic hazard determination point of view, to determine during the EIS process whether a landslide exists, and if so, the volume of the material involved. If the feature is a landslide, the excavation costs would be substantial, and the length of the dam would be significantly lengthened to fill in the excavated volume.

Note that landslides that are inactive under current conditions may become mobilized as the material becomes saturated by the impounded water, or may be mobilized by earthquake shaking. These considerations should be analyzed in this section of the draft EIS. 79

Section 4.3.2.3 "Black Rock Alternative – Long Term Impacts"

The draft EIS correctly points out that landslides are common in the Yakima fold belt (p. 4-37), and that old slides may become reactivated, and new slides form, as seepage from the reservoir infiltrates the surrounding hillsides and increases pore pressure. However, the draft EIS fails to point out that, additionally, old slides may become reactivated, and new slides form, under the influence of earthquake ground shaking. 80

The Black Rock report identified three large landslides on Horsethief Mountain (p. 21). Two of these landslides have runout zones extending into the proposed reservoir area. If a landslide occurred while the reservoir was full, it would displace water that would overtop the dam and possibly cause structural failure of the dam. For example, in 1963 a large landslide fell into the reservoir behind the Vaiont dam in the Italian Alps, causing a 100 m high wave that overtopped the dam, swept downstream, and killed 2600 people (the dam remained standing). The draft EIS fails to address this issue and so is inadequate. 81

Because of the concerns of landslides occurring due to seepage and earthquake shaking, and the potential catastrophic effects of a large landslide running into the reservoir, the EIS should contain detailed mapping of landslide potential of the surrounding hills, and a contingency plan to respond to a landslide into the reservoir. 82

Section 4.3.2.4 "Wymer Alternative – Long Term Impacts"

The draft EIS correctly points out that landslides are common in the Yakima fold belt (p. 4-37), and that old slides may become reactivated, and new slides form, as seepage

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from the reservoir infiltrates the surrounding hillsides and increases pore pressure. However, the draft EIS fails to point out that, additionally, old slides may become reactivated, and new slides form, under the influence of earthquake ground shaking. 83

A potential landslide has been identified under the south abutment, and no convincing evidence has been presented in the draft EIS to contradict that identification. (See discussion of section 2.2.2.3 above.) If a landslide occurred while the reservoir was full, it would displace water that would overtop the dam and possibly cause structural failure of the dam. The draft EIS fails to address this issue and so is inadequate. 84

Because of the concerns of landslides occurring due to seepage and earthquake shaking, and the potential catastrophic effects of a large landslide running into the reservoir, the EIS should contain detailed mapping of landslide potential of the surrounding hills, and a contingency plan to respond to a landslide into the reservoir. 85

<u>Section 4.3.2.5 "Wymer Dam Plus Yakima River Pump Exchange Alternative – Long Term Impacts"</u>

We express the same concerns about landslides into the Wymer reservoir. These are not considered in the inadequate draft EIS. 86

<u>Reservoir Induced Seismicity</u>

Reservoir induced seismicity ('RIS') is the triggering of earthquakes by the physical processes that accompany the filling of reservoirs. As of the mid-nineties there were over sixty well documented cases of RIS from around the world (USGS, 1996), including many earthquakes large enough to cause damage to nearby structures, and in at least two cases – Koyna, India, and Hsinfengkiang, China – the dams came close to failure (Allen, 1982). 87

RIS earthquakes can occur days to years after reservoir is filled. RIS earthquakes occurring immediately upon filling may be caused by elastic stress changes due to the weight of the impounded reservoir. Seismologists have developed a body of evidence during the last decade that shows earthquakes can be triggered by very small stress changes, on the order of one bar (one bar is about one atmosphere pressure). RIS occurrence after a time delay are likely due to pore water diffusion into the fault zone, driven by the reservoir head. RIS after several years may occur when the reservoir water level is changed; this is thought due to water diffusion plus the elastic stress changes (USGS 1996). Note that seasonally fluctuating water levels are planned for Black Rack and Wymer reservoirs (draft EIS p. 2-40 to 2-41). Deep reservoirs, such as those proposed at the Black Rock and Wymer sites, may be more prone to RIS than shallow reservoirs (USGS 1996).

RIS earthquakes have all the same effects as natural earthquakes discussed above: ground shaking, surface rupture, liquefaction, and landslides. Worldwide observations show that RIS earthquakes occur with a few tens of kilometers of the causative reservoir.

The draft EIS entirely neglects the issue of RIS at all and is therefore inadequate. The draft EIS ignored the recommendation of the PSHA study (p. 19) calling for baseline studies of RIS.

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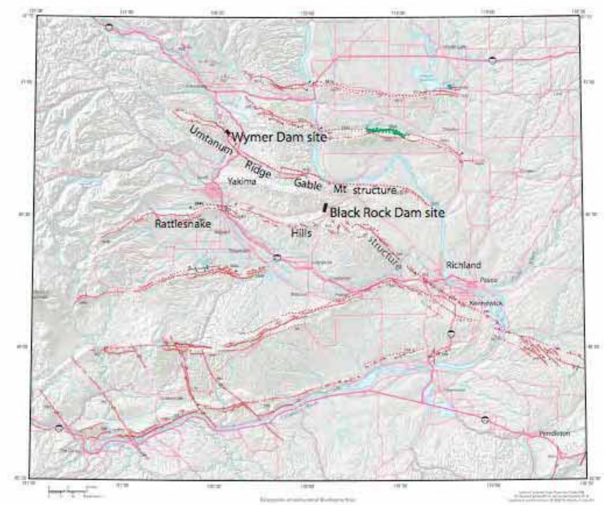

Figure 1. Faults and folds (red lines) in south-central Washington State. Note the proximity of major fault and fold structures to the proposed Black Rock and Wymer dam sites (indicated by black bars). Map is taken from Lidke, *et al.* (2003).

8

4. References

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Comment Letter No. 7 – Center for Environmental Law and Policy – Rachael Osborn

01 through 31	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
32	Comment noted. Water savings from Enhanced Water Conservation were included in the water budget modeling including in Section 5.3 of this Final EIS. See the response to your comment 01 in the December 2008 Final Planning Report/EIS regarding Reclamation's consideration of conservation.
33 through 39	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
40	As noted in Section 2.3.7.1 of this Final EIS (and Section 3.2.2 of the Draft Planning Report/EIS), the conservation water savings were determined using estimates from published Water Conservation Plans. Additional information is provided in the Technical Report on Enhanced Water Conservation that accompanied the Draft Planning Report/EIS. The analysis of the State Alternatives in the January 2008 Draft Planning Report/EIS was conducted at a programmatic level. Additional analysis is provided in this Final EIS; however, the analysis is still programmatic. As noted in Section S.7 of this Final EIS, additional project level will be conducted on the alternatives when they are brought forward. This approach is consistent with a "broad to narrow" approach or phased review and is consistent with WAC 197-11-060(5). WAC 197-11-060(5)(a) states that "Lead agencies shall determine the appropriate scope and level of detail of environmental review to coincide with meaningful points in their planning and decision making process." The State Alternatives presented in the January 2008 Draft Planning Report/EIS were developed in response to scoping comments. In order to meet Reclamation's schedule for the Draft Planning Report/EIS, Ecology and Reclamation determined that a programmatic level analysis of the State Alternatives was appropriate. The alternatives description and impacts analysis allowed the potential range of impacts to be identified. So that the broad implications and tradeoffs associated with the State Alternatives could be understood. The additional analysis provided in this Final EIS narrows the range of alternatives considered and further defines the range of impacts associated with them. Site-specific SEPA and/or NEPA analysis will be conducted when specific projects associated with the alternatives are brought forward.
41	Comment noted. No method exists currently in state law to change pricing structure or impose water fees.
42	See the response to your Comment Number 40 regarding the level of detail presented for the alternative.
43	Water metering and enforcement are not included in the Draft Planning Report/EIS or in this Final EIS because there are existing programs for both and they are being undertaken separately by Ecology. Water metering is required throughout the Yakima

	River basin consistent with RCW 90.03.360 and Order No. 77-2-01-01484-5.
44	For the Enhanced Conservation Alternative, the amount of conserved water was modeled using Reclamation's RiverWare modeling program as described in Section 5.2.3.1 of the January 2008 Draft Planning Report/EIS. The results indicate an increase in summer flows at the Parker gauge and at the mouth of the Yakima River. See the response to your Comment Number 40 regarding the level of detail in the Draft Planning Report/EIS and this Final EIS.
45	Comment noted. Without knowing exactly which projects will be implemented and where, it is not possible at this time to determine the effects of water conservation on stream flows in specific locations. Additional analysis of stream flow impacts is required and will be evaluated on a case by case basis when specific projects are brought forward.
46	See the response to your Comment 44 regarding how the estimates of conserved water were developed. See the response to your Comment Number 40 regarding the level of detail in the Draft Planning Report/EIS and this Final EIS. See the response to your Comment Number 43 regarding water metering.
47	The statement you cite from the introduction to the State Alternatives is followed by a more detailed description of Ecology's objectives for the Storage Study (paragraph 3 of Section 3.1.1). These objectives are: "provide additional water supplies for anadromous fish and irrigation, as well as to provide water for municipal growth." These objectives were further refined in the December 2008 Supplemental Draft EIS to: "provide water for irrigated agriculture and municipal water needs and to improve habitat for anadromous and resident fish" (last paragraph Section 1.2). The option to allow all conserved water to be retained by the implementing entity for use as irrigation or municipal and industrial use (Section 3.2.3 of the Draft Planning Report/EIS) is intended to encourage conservation and help meet the objectives of providing water for irrigated agriculture and municipal water needs, which are also goals of the proposal.
48	Comment noted. Ecology does not expect that an alternative that allocated all the conserved water to improving flows would provide an incentive for individual users to conserve.
49	Comment noted. Ecology believes that providing water for irrigation and municipal use are also public benefits.
50	The existing conserved water programs in the Yakima River basin—YRBWEP and the Trust Water Rights Program allocate 67 percent of conserved water for instream flow needs with the remaining 33 percent retained by the implementing entity. The Enhanced Water Conservation explores a different allocation percentage as a means to provide increased incentives for water conservation.
51	The assumption that 67 percent of the funding would come from the state was proposed as an alternative to the existing YRBWEP funding allocation. Ecology is considering alternative funding sources for all aspects of the Integrated Water Resource Management Alternative. These funding options will be further considered as the implementation plan is developed for the Integrated Water Resource Management Alternative (see Section

	S.5 of this document).
52	See the response to your Comment Number 41.
53	The cost of water treatment facilities for ground water injection was considered in the cost analysis. See Section 3.4.1.1 of the Draft Planning Report/EIS and Section 2.3.5.1 of this Final EIS. As noted in Section 5.6.2.3 of the Draft Planning Report/EIS, where feasible, direct injection facilities would be located with existing treatment facilities.
54	See the response to your Comment Number 40 regarding the programmatic nature of the evaluation of the analysis in the Draft Planning Report/EIS. Section 3.4.1.1 of the Draft Planning Report/EIS and Section 2.3.5.1 states that specific sites for ground water storage would be selected at a future time if the Ground Water Storage Alternative is carried forward and it notes that site-specific studies would be required to identify specific sites. This approach is consistent with WAC 197-11-060(5).
55	The relevant sections for mitigation of impacts from the State Alternatives are in Chapter 5. Chapter 5 lists general mitigation requirements that would be required for impacts and states that additional specific mitigation measures would be identified in future project level environmental analysis. At a programmatic level of evaluation, it is important to identify the feasibility of mitigation likely to be required and the feasibility of implementing that approach for the identified impacts so that decision-makers can determine where the impacts can be reasonably mitigated. Further analysis is not warranted at the programmatic stage. The sections you specifically cite as having inadequate mitigation measures were addressed by Reclamation in its Final Planning Report/EIS.
55 through 87	See Reclamation's responses in the Final Planning Report/EIS.

Comment ORG-0008

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Yakima, Washington

Yakima Basin Storage Alliance

Comments on the Yakima River Basin Storage Feasibility EIS Draft 3/31/2008

YBSA wishes to thank the Washington State Department of Ecology and the US bureau of Reclamation for their work preparing this report. This report factually demonstrates the need for new storage in the Yakima River Basin. If we do not take action to develop more storage, then the future economic and environmental health of the Basin will be effectively dammed. This report documents several critical issues.

1. Yakima River Basin storage capacity is currently 30% of average annual yield, the lowest of any large irrigation project in the West.
2. The BOR has insufficient water to meet the needs of both fish and agriculture in most years.
3. There are 225,000 acres with interruptible water rights, limiting it value to the vagaries of snow pack and snow melt.
4. Washington state legislature has mandated more new storage.
5. Washington State DOE reports indicate snow pack will decrease significantly in future years due to climate change.
6. DOE has declared the need for additional storage.
7. Environmental objectives have increased the demand for storage (without increasing the supply).
8. Municipal demands have been increasing (and have not supplied more storage).

The study tells us 35 sites have been considered over the last 30 plus years. The best 6 sites were selected for further analysis. Those rejected did not meet the 3 criteria of the study. Please note the in-stream sites were rejected for environmental reasons. In stream storage is unacceptable in today's society, even though it is the cheapest storage.

The options are listed below with our comments:

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1. Black Rock. "Reclamation has concluded that Black Rock is technically viable… and would meet the goals of the Storage Study."
2. Wymer Dam and Reservoir. Reclamation concluded '…this is better than the no-action alternative." The project de-normalizes the Yakima hydrograph and should therefore be rejected. The volume added amounts to no more than the proverbial "band-aid". 01
3. Wymer Dam Plus Yakima River Pump Exchange. This option reduces the de-normalizing of option 2 at an additional cost of $2.9 Billion. 02
4. Enhanced Water Conservation. Conservation has been actively pursued for the last 30 years and will continue as profit and technology allow. But the volume of water saved is minor compared to the combined needs for water. The best way to increase the value of conserved water is to STORE it.

Ecology's Comment Response Numbers in this Document

5. Market –Based Reallocation of Water Resources. This option is already practiced in dry years. Again the volumes available pale next to the demands, and necessitate fallowing ground, which again drastically curtail economic growth. Another difficult issue here is that water rights have a significant public value and therefore complicate sales. 03
3
6. Groundwater Storage. This is projected to provide only 1,900 ac-ft in drought years.

YBSA supports the only option which meets the needs of our environment and our economy. The components of Black Rock are proven and producing the desired results. They are the Umatilla pump exchange and the Banks Lake pumped storage reservoir. We cannot afford the second best option; we must protect our economy and our environment.

YBSA comments are outline below

1.P&G guidelines

2.Anadromous fish

3.Irrigation

4.Recreation

5.Regional Economic impacts

6.Economic Justification

7.Pump Generation

8.Construction costs

9.Contrasts in alternatives Operations

10.Comprehensive programs

11.Reservoir Seepage

12.Project Financing and Repayment

13.Future Values

14. Report to Congress

Principles and Guidelines

Reclamation and other federal water resource agencies are required to use the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (P&Gs). The P&Gs establishes four accounts "to facilitate evaluation and display of alternative plans" and requires that the alternative with the greatest net economic benefit consistent with protecting the Nations environment, the National Economic Development (NED) Plan, be selected unless the Secretary grants an exception.

The NED Plan is supposed to measure increases in the economic value in the national output of goods and services. In contrast is the Regional Economic Development (RED) account which is supposed to reflect changes in the distribution of regional activity that will result from a project. These regional economic impacts are commonly measured as regional employment, regional output of goods and services, and regional income. These regional economic impacts are intended to account for not only the direct impact on the primary affected sectors of the economy but also the secondary impacts that are generated by other sectors.

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Regional economic impacts however, are not considered in economic justification. We understand the rationale for this is not to favor one area of the country over another area in the decision-making process of Federal water resource projects.

We believe application of the P&Gs and its implications on policies and processes of a Federal agency such as Reclamation severely constrains the agency in

Reclamation's Planning Report/ EIS Comment Responses

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constructively addressing solutions to water resource issues. When it comes to solutions to the water supply issues in the Yakima basin, the P&Gs and economic justification becomes just that --- a constraint which Reclamation knows full well cannot be overcome. This has been the case since the P&Gs were mandated in 1983 and will remain so unless appropriate action is taken to constructively reassess its value in Federal participation in solving regional water resource issues. With many regions facing major water resource issues it is imperative that Reclamation with a long history of capably assisting in solving water issues plays an active and constructive role.

Anadromous Fish

05

In the Pacific Northwest we are striving to preserve and improve our anadromous fishery. The Yakima basin presents a unique opportunity to take positive action in regard to water and habitat; the vital components for salmon and steelhead. Yet, the "measuring stick" for a water exchange of the magnitude of the Black Rock Alternative for anadromous fishery is based solely on the monetary value of the number of fish harvested.

We do not see such a "measuring stick" being applied to other salmon recovery and enhancement activities in the Yakima basin and the Pacific Northwest. Of course this would not be acceptable in the development of biological opinions, in sub-basin planning, nor in on-going court actions dealing with salmon recovery and the cultural values of salmon and steelhead to our Native Americans. In view of this, we believe it is completely inappropriate to attempt to monetarily value salmon and steelhead recovery and enhancement activities.

The true value of salmon and steelhead spawning and rearing areas such as the Yakima River basin cannot be captured by fish harvested or escapement figures. Once anadromous fish exit the Yakima basin survival is contingent solely on external conditions. What is missing is the production capability or "potential fish carrying capacity" of the Yakima basin attributable to water which the Storage Study has addressed and to recovered habitat which may require physical alternations, which the Storage Study has not, but should, address.

06

Carrying Capacity

07

We believe the BOR has failed to maximize the potential of Black Rock to restore Salmon in the Yakima, and urge the BOR to utilize Dr Jack Stanford's work to maximize the fish carrying capacity of the Yakima Basin. We know that it is very difficult to accurately forecast the number of returning spawners to a tributary, and therefore the measurement of carrying capacity of similar known reaches of comparable quality and magnitude maybe the best measure for evaluation. Keys to Salmon recovery are increased water volume, access to more habitats in key reaches and access to old spawning grounds above the dams of the upper reservoirs. YBSA will work with Dr. Stanford to obtain carrying capacity numbers for Salmon restoration. So too should BOR. 07

If, in view of the foregoing, it is deemed necessary that a monetary value is assigned to the anadromous fishery one approach that might be considered is to base it on the cost of a "single purpose project" required to restore the flow regime of the Yakima and Naches Rivers to more closely resemble the natural (unregulated) hydrograph. This is commonly used with respect to developing a monetary value for municipal and industrial water supplies. However, a concern with this approach is that further storage development on Yakima basin main-stem and tributary rivers is not environmentally and biologically acceptable and thus would not represent a most likely single purpose alternative. 08

We further believe the desired goal of normalizing the hydrograph of the Yakima as been overlooked. It is the first criteria of the authorization act. Wymer storage site should be eliminated or assessed heavy penalties for violating the first principle, if not; Black Rock should be heavily favored for its contribution to normalization. OFF-CHANEL STORAGE IS MORE EXPENSIVE and that societal value must be quantified in your B/C analysis, otherwise damming Yakima Canyon is the cheapest and most logical alternative. 09

Black Rock has 3 other benefits that are not quantified in the BOR report but are monitored and valued as environmental imperatives for Salmon recovery. Pollution mitigation and water temperature reduction are greatly assisted by increasing the volume of upper mountain water that flow though the entire Yakima if Black Rock supplies the Roza and Sunnyside irrigation districts. In addition Black Rock offers the ability to eliminate the current 'Flip/Flop' on the Tieton River, which would then be available to be a more productive fishery. These values must also be quantified. We also request you include the climate change scenario which shows a 50% likely hood/yr of 1994 magnitude droughts on Salmon recovery too. 10 11 12

Irrigation

Irrigation benefits are measured as the difference in net farm income realized from a full water supply compared to a deficient supply. In the past, this has reflected the net farm income from dry-land production compared to irrigated production resulting in a significant difference, and irrigation benefit. However, when faced with periodic inadequate water supplies such in the Yakima basin, accounting for the probability of occurrence based on a historical period of 13

record, and then discounting these over a 100-year period of analysis, significantly reduce the irrigation benefits so that they account for only 8 percent of the total estimated benefits of the Black Rock Alternative. 13

This analysis considers only the net income realized by the farmer which supposedly measures the increase in the economic value in the national output of goods and services. No effort is made to look at the economic value of these agricultural products as they move through the agricultural processing sectors into the international export market. It is interesting to note that approximately 30 percent of the Yakima valley apple production enters the international market and is exported to Mexico, Canada, Taiwan, India, China, and other countries. We do not see how such export which positively affects our nation's trade balance is recognized by this "net farm income" analysis.

Further, we believe the economic impacts of deficient water supplies are not restricted solely to the year in which they occur as there is also a negative economic effect in intermediate years (see "Regional Economic Impacts" discussion). 14

What is discerning is that no consideration is given to "looking forward" with regard to the potential impacts of climate change on the irrigation water supply. With all of the current emphasis on climate change we believe that a "what if scenario(s)" is most important to display potential impacts on the adequacy of the water supply for irrigation and anadromous fishery. This is particularly germane in view of the Yakama Nation's "time immemorial" right to the flow necessary to maintain anadromous fish life in the river as indicated by the Adjudication Court. 15

Recreation

The recreation carrying capacity at a Black Rock reservoir is capped at 700,000 annual visits estimated to be reached by the 23rd year of operation. There is some information in the "Economics Technical Report for the Yakima River Basin" (pages 36 and 37) which very briefly discusses the basis for estimating carrying capacity. However, this does not explain some of the constraints such as the "boats at one time capacity" and "developed campsites" used in the analysis. Since carrying capacity directly affects the benefits we are interested to know how this number was developed. 16

Regional Economic Impacts

We believe the regional economic impacts are very important in the decision-making process as noted on page xviii of the Executive Summary which states in part:

"…none of the alternatives developed in this feasibility study meet the requirements to be identified as the NED Alternative. The alternatives do, however, result in positive changes in regional income and regional employment, anadromous fish habitat improvements, and improved urban and community attributes as shown in the RED, EQ, and OSE accounts, respectively. Because of these positive changes, the alternatives are presented in this Draft PR/EIS, although no alternative has been identified as a "preferred alternative." A preferred alternative may be identified in the Final PR/EIS based on factors other than the economic standard. The reason for the selection will be explained in the Final PR/EIS".

Our understanding of regional economic impacts is that it includes the direct impact (measured as the gross farm income) and also the secondary impacts often referred to as "multiplier effects". Regional economic impacts are expressed in terms of number of jobs and in monetary terms of output and income. Section 4.14.1.4 (page 4-205 of the PR/EIS) indicates that the gross on-farm income from Yakima Project irrigated lands generates over 12,000 jobs, almost $400 million in labor income, and over $1 billion in output annually in the four-county study area.

Reclamation's Planning Report/ EIS Comment Responses

Table 4.48 of the PR/EIS (page 4-213) shows that in a year like 1994, when the proration level is 27 percent an alternative which moves the proration level to 70 percent results in an additional 2,608 jobs, a $234 million increase in regional economic output, and an increase of $83 million in labor income. Several things seem to be occurring: first, the irrigation goal of the Storage Study is to provide a 70 percent proratable water supply in dry years and the regional economic activity which occurs between a full water supply and the 70 percent level is not measured; 17 second, there is no accounting for the adverse economic impacts related to the unreliability of the water supply for permanent agricultural crops such as in securing financing and contracts for marketing of these crops; 18 and third, regional economic impacts are not displayed in a manner similar to the benefits to allow a meaningful comparison with the expenditures incurred which generate the economic impacts. 19

20 The entire economic focus in the draft PR/EIS is on benefits for economic justification. The difference between benefits and regional economic impacts and the exclusion of the latter from the economic justification analysis is difficult to comprehend. With Reclamation policy requiring non-Federal cost sharing, regional economic impacts are most important to State and local agencies and entities. It is our view the draft PR/EIS is very deficient in this area.

Recreation

Reclamation's Planning Report/ EIS Comment Responses

The recreation regional economic impacts shown in the draft PR/EIS represent expenditures from recreators living outside of the four-county region. The reason for this is explained as "…within-region recreators are assumed to spend the majority of their recreation expenditures within the region regardless of the alternatives under consideration, implying they would generate little by way of additional regional economic activity". 21 For the Black Rock Alternative, annual nonlocal visitation estimates were estimated at 28 percent of the total annual visitation. Thus it appears that expenditures of local recreators associated with new slack-water recreation opportunities created by a Black Rock Alternative are not included in the regional economic impacts. We question this assumption.

22 YBSA made the effort to secure and finance an independent assessment of what the construction of a Black Rock reservoir could mean with respect to water oriented recreation opportunities and the potential for an at-site master planned development. The report prepared by the consultants is referenced in Section 6.1.1.2 (page 6-3) of the Draft PR/EIS with the indication that "…these potential revenue flows would be regional in scope and not the national economic benefits that Reclamation and other Federal studies are mandated to address for the economic justification of Federal water resource projects". However, there is no further reference of the results of this assessment in the Draft PR/EIS.

This document estimates the present worth value of the regional economic impacts as follows:

Expenditures incurred by recreationists	$1.280 billion
Expenditures incurred for the master planned development	
(residential, commercial, and resort)	$2.120 billion
Total	$3.400 billion

We do not see why this information is excluded from the regional economic development analysis. Based upon what has occurred in the vicinity of other Reclamation reservoirs in the Pacific Northwest this information reflects a future potential which should not be ignored. While there is no assurance at this time that such development will occur above the reservoir "footprint", there is no assurance that it will not occur. A case in point is the Suncadia development in the vicinity of Cle Elum Reservoir that not very long ago was "not on the horizon".

Pump-Generation

Every opportunity should be explored for inclusion of potential "revenue producing" measures at a Black Rock Project that would help to defray costs. To date, consideration has not been given to the construction of a pump-generator at Black Rock dam that would use the water stored in the reservoir released through a generator at the base of the dam for hydroelectric generation. This released water would then be pumped back to the reservoir and the cycle could be repeated as appropriate to coincide with high load/low load scenarios as well as in conjunction with wind power facilities. What would be required is a re-regulating impoundment in the vicinity of the dam for storage of the released water for short intervals and subsequent recycling back to Black Rock reservoir. This type of pump-generator operation has been in use at Oroville Dam in California for many years. Relicensing of the hydroelectric facilities at Oroville Dam is currently underway. 23

As the Northwest increases investments in alternative energy, integration of these various sources need to be coordinated, and stored to maximize their values. That requires a battery. In Europe the wind and nuclear generators are tied to a grid which in which, when supplies exceed demand pumps water up fiords in Sweden and Finland and Norway. The higher the lift, the better it can store more energy. Black Rock offers that potential. 24

We further believe that to preserve the Recreational values, we can use the diurnal rate differential to dampen the fluxuation of the water level in the Reservoir.

It is our intent to pursue discussions with others to determine the viability of this operation from both an engineering and financial perspective.

Construction Cost

The magnitude of "add-ons" to the estimated cost of in-field construction activities incurred by contractors for labor, materials, and equipment ("pay items") is overwhelming. These add-ons increase the estimated "pay items' from \$2.250 billion to \$4.500 billion. Of particular significance is the 35 percent noncontract cost of \$1.200 billion. What we see occurring is an effort to be most liberal in estimating project costs yet on the other hand, most conservative in estimating project benefits (see "Economic Justification" discussion). 25

With regard to the construction period which is used in developing the interest during construction cost, we suggest the projected 10-year construction period is influenced to a large extent by expectations of annual construction appropriations 26

Reclamation's Planning Report/ EIS Comment Responses

to Reclamation rather than the contractor(s) capability to construct the project. The result is increased costs which are used in the benefit-cost analysis. 26

YBSA believes that large projects can be best cost controlled by using "Design/Build" concept, whereby the builder receives the designs 80% completed so that they can best match current resources to the solution, saving time and money.

Contrasts in Alternative Operations

A comparative analysis of what each alternative will do and will not do with respect to providing flexibility in system operations and the capability for adaptive management in addressing the basin's anadromous fishery should be included in the Draft PR/EIS. 27

Comprehensive Program

There is the concern the accomplishments of restoring the flow regime of the Yakima and Naches Rivers to more closely resemble the natural (unregulated) hydrograph are not fully measured. This is because the Storage Study does not consider the potential productive capability of salmon and steelhead habitat in the major floodplains currently constrained by physical alterations. In addition, tributary habitat restoration and its correlation with the positive effects of main stem flow improvements in improving anadromous fishery production has not been considered. 28

A comprehensive approach to the water issues of the Yakima basin was put in place with the Yakima River Basin Water Enhancement Project activities initiated in the early 1980s. It was recognized the pieces necessary for a successful resolution of these issues are so intertwined that a comprehensive approach was necessary. Some of these pieces such as fish passage and protective facilities have been implemented. Other pieces such as the "Basin Conservation Program", the recent work of the Yakima Basin Fish and Wildlife Recovery Board, fish passage to spawning areas upstream of existing Yakima Project dams, and the Storage Study are ongoing. Title XII of the Act of October 31, 1994, recognizes the need for a comprehensive plan and provides authorities for actions such as tributary flow enhancement measures including the restoration of stream habitat.

Reservoir Seepage

We know about the seepage potential, but the BOR has failed to mention the mitigation possibilities. THIS MUST BE INVESTIGATED. This is too big a problem not to have aired and open to public comment. We also believe that the 29 solutions to this problem need to be discussed and understood by the public. We believe that intercepting the seepage, and using the "new return flows", can be a very significant benefit for the Tri-Cities municipal needs, or augmenting flows in the Hanford reach on the Columbia, the Horns Rapids reach of the Yakima, or even to agricultural, or commercial interests, while at the same time virtually eliminating the threat to the Hanford Reservation contaminants. YBSA will challenge the EIS if no public comment period is allowed for mitigation. 29

Project financing and repayment

The BOR failed to discuss how to pay for this project. YBSA will work with Washington State to develop a plan. YBSA will include a method to assess irrigation payments as well as debt structure from the various benefactors including power and recreation. The BOR should do like wise and assist the effort. YBSA has received the go-ahead from Washington State to have a "Four Corners" meeting to address the issues. Commissioner Johnson has been invited. 30

YBSA's stated goal is to maximize the benefits for all sectors. We adopted this goal after being advised by senior BOR officials, who stated that no large projects would be built without multiple paying partners, and resolving treaty rights. The BOR study must recognize and maximize the recreational, power and Salmon recovery benefits to achieve it's goals and have the tools to do it's job of managing water in the Northwest. We urge the BOR to include the Mitchel-Nelson report (Jan 2007) which analyzed the recreational development potential. THIS VALUE IS CRITIAL to recognize, in order to attract private capital for construction and operation. 31

Future Values

YBSA urges the BOR to use past values for benefits to assess LONG TERM TRENDS, and project those values into the future including land values, in a Future Value analysis, and compare that Future Values of the alternatives 50 and 100 years out so that all can compare the alternatives to the no-action alternative. 32
We further believe the BOR must recomputed its NPV analyses using a 3 year build time, to show the value to compressing the build time. We also request the BOR include the climate change scenario which shows a 50% likely hood/yr of 1994 magnitude droughts on economic values for the region. 33

Report to Congress

These pieces must be woven into a comprehensive plan and a legislative package developed so all of the interests of the Yakima basin are assured that the authorities and mechanisms for funding are in-place. This comprehensive plan 34

approach fully promotes the concept of federal-nonfederal cost sharing which is so necessary in addressing today's water resource issues. We urge you to take this into consideration in the preparation of a Final Storage Study PR/EIS. 34

Sincerely,

Charlie de La Chapelle,

Vice Chair, on behalf of the Yakima Basin Storage Alliance

3/31/08

Comment Letter No. 8 – Center for Environmental Law and Policy – Rachael Osborn

01 through 31	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
32	Comment noted. Water savings from Enhanced Water Conservation were included in the water budget modeling including in Section 5.3 of this Final EIS. See the response to your comment 01 in the December 2008 Final Planning Report/EIS regarding Reclamation's consideration of conservation.
33 through 39	See Reclamation's responses in the December 2008 Final Planning Report/EIS.
40	As noted in Section 2.3.7.1 of this Final EIS (and Section 3.2.2 of the Draft Planning Report/EIS), the conservation water savings were determined using estimates from published Water Conservation Plans. Additional information is provided in the Technical Report on Enhanced Water Conservation that accompanied the Draft Planning Report/EIS. The analysis of the State Alternatives in the January 2008 Draft Planning Report/EIS was conducted at a programmatic level. Additional analysis is provided in this Final EIS; however, the analysis is still programmatic. As noted in Section S.7 of this Final EIS, additional project level will be conducted on the alternatives when they are brought forward. This approach is consistent with a "broad to narrow" approach or phased review and is consistent with WAC 197-11-060(5). WAC 197-11-060(5)(a) states that "Lead agencies shall determine the appropriate scope and level of detail of environmental review to coincide with meaningful points in their planning and decision making process." The State Alternatives presented in the January 2008 Draft Planning Report/EIS were developed in response to scoping comments. In order to meet Reclamation's schedule for the Draft Planning Report/EIS, Ecology and Reclamation determined that a programmatic level analysis of the State Alternatives was appropriate. The alternatives description and impacts analysis allowed the potential range of impacts to be identified. So that the broad implications and tradeoffs associated with the State Alternatives could be understood. The additional analysis provided in this Final EIS narrows the range of alternatives considered and further defines the range of impacts associated with them. Site-specific SEPA and/or NEPA analysis will be conducted when specific projects associated with the alternatives are brought forward.
41	Comment noted. No method exists currently in state law to change pricing structure or impose water fees.
42	See the response to your Comment Number 40 regarding the level of detail presented for the alternative.
43	Water metering and enforcement are not included in the Draft Planning Report/EIS or in this Final EIS because there are existing programs for both and they are being undertaken separately by Ecology. Water metering is required throughout the Yakima

	River basin consistent with RCW 90.03.360 and Order No. 77-2-01-01484-5.
44	For the Enhanced Conservation Alternative, the amount of conserved water was modeled using Reclamation's RiverWare modeling program as described in Section 5.2.3.1 of the January 2008 Draft Planning Report/EIS. The results indicate an increase in summer flows at the Parker gauge and at the mouth of the Yakima River. See the response to your Comment Number 40 regarding the level of detail in the Draft Planning Report/EIS and this Final EIS.
45	Comment noted. Without knowing exactly which projects will be implemented and where, it is not possible at this time to determine the effects of water conservation on stream flows in specific locations. Additional analysis of stream flow impacts is required and will be evaluated on a case by case basis when specific projects are brought forward.
46	See the response to your Comment 44 regarding how the estimates of conserved water were developed. See the response to your Comment Number 40 regarding the level of detail in the Draft Planning Report/EIS and this Final EIS. See the response to your Comment Number 43 regarding water metering.
47	The statement you cite from the introduction to the State Alternatives is followed by a more detailed description of Ecology's objectives for the Storage Study (paragraph 3 of Section 3.1.1). These objectives are: "provide additional water supplies for anadromous fish and irrigation, as well as to provide water for municipal growth." These objectives were further refined in the December 2008 Supplemental Draft EIS to: "provide water for irrigated agriculture and municipal water needs and to improve habitat for anadromous and resident fish" (last paragraph Section 1.2). The option to allow all conserved water to be retained by the implementing entity for use as irrigation or municipal and industrial use (Section 3.2.3 of the Draft Planning Report/EIS) is intended to encourage conservation and help meet the objectives of providing water for irrigated agriculture and municipal water needs, which are also goals of the proposal.
48	Comment noted. Ecology does not expect that an alternative that allocated all the conserved water to improving flows would provide an incentive for individual users to conserve.
49	Comment noted. Ecology believes that providing water for irrigation and municipal use are also public benefits.
50	The existing conserved water programs in the Yakima River basin—YRBWEP and the Trust Water Rights Program allocate 67 percent of conserved water for instream flow needs with the remaining 33 percent retained by the implementing entity. The Enhanced Water Conservation explores a different allocation percentage as a means to provide increased incentives for water conservation.
51	The assumption that 67 percent of the funding would come from the state was proposed as an alternative to the existing YRBWEP funding allocation. Ecology is considering alternative funding sources for all aspects of the Integrated Water Resource Management Alternative. These funding options will be further considered as the implementation plan is developed for the Integrated Water Resource Management Alternative (see Section

	S.5 of this document).
52	See the response to your Comment Number 41.
53	The cost of water treatment facilities for ground water injection was considered in the cost analysis. See Section 3.4.1.1 of the Draft Planning Report/EIS and Section 2.3.5.1 of this Final EIS. As noted in Section 5.6.2.3 of the Draft Planning Report/EIS, where feasible, direct injection facilities would be located with existing treatment facilities.
54	See the response to your Comment Number 40 regarding the programmatic nature of the evaluation of the analysis in the Draft Planning Report/EIS. Section 3.4.1.1 of the Draft Planning Report/EIS and Section 2.3.5.1 states that specific sites for ground water storage would be selected at a future time if the Ground Water Storage Alternative is carried forward and it notes that site-specific studies would be required to identify specific sites. This approach is consistent with WAC 197-11-060(5).
55	The relevant sections for mitigation of impacts from the State Alternatives are in Chapter 5. Chapter 5 lists general mitigation requirements that would be required for impacts and states that additional specific mitigation measures would be identified in future project level environmental analysis. At a programmatic level of evaluation, it is important to identify the feasibility of mitigation likely to be required and the feasibility of implementing that approach for the identified impacts so that decision-makers can determine where the impacts can be reasonably mitigated. Further analysis is not warranted at the programmatic stage. The sections you specifically cite as having inadequate mitigation measures were addressed by Reclamation in its Final Planning Report/EIS.
55 through 87	See Reclamation's responses in the Final Planning Report/EIS.

Comment Letter ORG-0008 – Yakima Valley Storage Alliance – Charlie de la Chappelle

01 through 02	See Reclamation's responses in the Final Planning Report/EIS.
03	Comment noted. The Market-Based Reallocation of Water Resources Alternative proposes market strategies that would be practiced in both drought and non-drought years.
04 through 34	See Reclamation's responses in the Final Planning Report/EIS.

Comment PUB-0001

Reclamation's Planning Report/ EIS Comment Responses

Economic analysis of Black Rock Alternative is incomplete/ incorrect/outdated

- Economic analysis does not, and the final PR/EIS should, take into account the following: 01
  - Benefits of recreational development above the waterline, (estimated $3.5 billion in Mitchell Nelson study commissioned by YBSA);
  - Benefits to salmon recovery (estimated $2.6 billion by YBSA), including Yakama's cultural values for salmon recovery,
  - Economic benefits to the area of constructing Black Rock,
  - Benefits of eliminating agricultural losses resulting from droughts
  - Benefits resulting from amelioration of Treaty rights
  - Economic benefits resulting from recreation, tourism, and commercial development; and generation of energy.
  - Effects of climate change.

Amber Hansen, Port of Sunnyside; David McFadden, Yakima County Development Association; Doug Palachuk; Carpenter Farms; Michael Morrisette, Greater Yakima Chamber of Commerce; Steven George, Hop and Dairy Association; Thomas Allen, Joel Freudenthal, Yakima County Public Services; Gary Lukehart, YBSA; Warren Dickman, YBSA; Ken Nelson, Lower Yakima Valley, Yakima Valley Tri-Cities Association, Washington Association of Realtors; Tom Carpenter; Arnold Martin, Port of Sunnyside; Phil Williams; Glenn Clark; Art King, YBSA; Pete Gier; Harlan Hall; Charlie de la Chapelle, YBSA

- Need future value of Black Rock (not using historical values for commodities) 02

Charlie de la Chapelle, YBSA

- The methodology used to determine the cost-benefit ratio is flawed. All factors related to the cost of the project must be assigned monetary values to create an accurate ratio, e.g., decision to use offstream storage facilities, creation of more normative flows; decision to not bring new acreage into production; creation of a reliable water supply, not a new supply. 03

Mike Leita, Yakima County; Rick Glenn, AmericanWest Bank;

- Rationale of no less than 70 percent proration is not included in the economic analysis. 04

Joel Freudenthal, Yakima County Public Services;

Reclamation's Planning Report/ EIS Comment Responses

- Economic analysis misses the point, premise, and legislative intent. 05

Joel Freudenthal, Yakima County Public Services;

- Economic analysis is inconsistent with *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&Gs).* 06

Joel Freudenthal, Yakima County Public Services;

- The multiplier effect for the basin is 2-5; those benefits were not included in the study. 07

Arnold Martin, Port of Sunnyside

- OSE and EQ accounts do not reflect potential mitigation for seepage from the Hanford Site. 08

Terry Keenhan, Yakima County

- Was loss of 20,000 acres of orchard in 1 year accounted for in the economic analysis? 09

Jim Amundson

Black Rock Alternative is the appropriate alternative

- Black Rock Alternative is the only alternative that provides sufficient water for fish passage and drought relief; additional storage is needed; water conservation and other methods are inadequate. 10

David McFadden, Yakima County Development Association; Jim Breedlove; Steve George, Hop and Dairy Industries; Michael Morrisette, Greater Yakima Chamber of Commerce; Arnold Martin, Sunnyside Port District; Donald Leippert; Rick Glenn, AmericanWest Bank; Tom Carpenter; Phil Williams; Pete Gier; Harlan Hall; Charlie de la Chapelle, YBSA; Brad Toner;

- Black Rock Alternative is the only alternative that meets the criteria set forth by Congress. 11

Amber Hansen, Port of Sunnyside; Michael Morrisette, Greater Yakima Chamber of Commerce; Arnold Martin, Sunnyside Port District; Rick Glenn, AmericanWest Bank; David Rupe; Charlie de la Chapelle, YBSA; Brad Toner;

- No Action Alternative is not acceptable. 12

Mel Wagner, Rockey Marshall, YBSA; Michael Morrisette, Greater Yakima Chamber of Commerce; Amber Hansen, Port of Sunnyside; David McFadden, Yakima County Development Association; Chris Nass, Yakima Association of Realtors; Jim Sewell, Port of Grandview; Ken Nelson, Lower Yakima Valley, Tri-Cities Association; Washington Association of Realtors; Pete Gier; Dave Rupe; Charlie de la Chapelle, YBSA; Brad Toner.

Reclamation's Planning Report/ EIS Comment Responses

Insufficient alternatives evaluated

Ecology's Comment Response Numbers in this Document

- Bumping Lake enlargement should have been considered. 13

Rick Dieker

14
- Need analysis of floodplain and reach restoration and combined effects of State alternatives. 14

Michael Garrity, American Rivers

- Pipeline from Columbia River to Sunnyside would be adequate to fill Roza Canal and should be considered as an interim solution. 15

Rick Lamoureux;

Ecology should have looked at other alternatives

16
- Alternative to groundwater for agricultural users in Odessa 16

17
- Sources of water supply for pending water right applications 17

18
- New uninterruptible water supply for holders of interruptible water rights on the Columbia River mainstem 18

Joel Freudenthal, Yakima County Public Services

Climate change was not evaluated sufficiently

- The effect of climate change was not evaluated sufficiently. 19

Terry Keenhan, Yakima County; Doug Palachuk, Carpenter Farms; Arnold Martin, Port of Sunnyside; David Rupe;

Black Rock Alternative is not the appropriate alternative/not fully evaluated

- It is not economically viable; benefit-cost ratio provided in Draft PR/EIS is too optimistic. 20

John Osborn, CELP; Rick Dieker; Vince Panesko

- It is too costly 21

Michael Garrity, American Rivers; John Osborn, CELP; Mike Lilga; Carol Moser;

- It is not energy-efficient. 22

John Osborn, CELP; Dan Kinney; Rick Lamoureux;

- It provides too little benefit to fish. 23

Michael Garrity, American Rivers;

Reclamation's Planning Report/ EIS Comment Responses

- How will added storage volume be used in years that it is not needed? Will you open more land than in times of drought will require additional water? 24

Jack Dawson

- Increased recreational and commercial development is speculation and should not be used as justification for Black Rock Alternative. 25

Dan Kinney

- Concerned that development based on the water in Black Rock Reservoir and the M&I water use would become "drivers" of Black Rock in the future, and the fluctuating water levels would not be good for associated recreational and commercial development. 26

Mickey Chamness;

- Black Rock Dam is oversized (larger than Grand Coulee Dam). 27

Dan Kinney; Mike Lilga; Bob Schweighardt

- Failure of a dam this size would be catastrophic; further engineering studies are needed. 28

Jim Stoffels; Rick Leaumont, Audubon Society; Bob Schweighardt; Mike Luzzo

- Ecology of large dams needs to be evaluated. 29

Dana Ward, Audubon Society;

- Black Rock Reservoir would be dry in the summertime. 30

Carol Moser;

- Uncertain where water to fill Black Rock Reservoir will come from. 31

John Osborn, CELP;

- Enormous evapotranspiration on reservoir will increase humidity in the area. 32

Carol Moser; Rick Lamoureux; Dana Ward, Audubon Society;

- Black Rock Alternative will replenish the groundwater in the area. 33

Donald Leippert; Arnold Martin, Port of Sunnyside;

- Seepage from Black Rock reservoir would mobilize contaminated groundwater beneath the Hanford Site and carry it to the Columbia River. New DOE model should be used to evaluate the effects. DOE's study should be published and reviewed before decision is made. 34

Michael Garrity, American Rivers; John Osborn, CELP; Mike Lilga; Rick Leaumont, Audubon Society; John Lucas; Carol Moser; Rick Lamoureux;

Reclamation's Planning Report/ EIS Comment Responses

Mickey Chamness; Jack Dawson; Vince Panesko; Duane Faletti; Mike Luzzo; Carole Byrd.

- Effects on groundwater levels need to be evaluated. 35

Dana Ward, Audubon Society;

- Geology beneath damsite is unstable: There is a thrust fault beneath the proposed damsite and is also prone to landslides. 36

John Osborn, CELP; Walter George; Mike Lilga; Rick Leaumont, Audubon Society; Carol Moser; Mickey Chamness; Jack Dawson; Bob Schweighardt; Mike Luzzo; Carole Byrd; Jack Dawson

- Reservoir will not provide quality drinking water. 37

Vince Panesko

- Concern about effect on fish of mixing Columbia River and Yakima River water (false attraction). 38

Carole Byrd; Jack Dawson Rick Leaumont, Audubon Society

- Concern about interruption of migratory wildlife corridor between the Hanford Reach National Monument and the Yakima Firing Range. 39

Rick Leaumont, Audubon Society; Dana Ward, Audubon Society; John Lucas;

- Effect on shrub-steppe corridor needs to be evaluated. 40

Dana Ward, Audubon Society;

- Analyses are not sufficient for an EIS. 41

Rick Leaumont, Audubon Society; Dana Ward, Audubon Society; John Lucas; Jack Dawson

- Wymer Dam and Reservoir is more feasible than Black Rock Alternative. 42

Rick Dieker;

If a decision is made to proceed with planning for Black Rock project, we strongly recommend adoption of the following measures:

- Consider the PR/EIS as a feasibility study only and develop a new comprehensive Environmental Impact Statement. 43
- Passage of Federal and State legislation to transfer water rights to fish and wildlife (held in trust by the U.S. Fish and Wildlife Service, U.S. Marine Fisheries Service, and Washington Department of Fish and Wildlife. 44
- Acquire lands along the Columbia River that will unite the National Monument and the Firing Center as well as a corridor along the ridgeline to Yakima – add these lands to the Monument. 45
- Project waters mixed with Columbia River water should be diverted into wetlands established in the Yakima Valley – to prevent their introduction into the Yakima River. 46

Reclamation's Planning Report/ EIS Comment Responses

- Establish dikes and flood in Black Rock reservoir so that shallow wetlands remain as reservoir waters are drawn down. Will benefit fish, wildlife, recreation, and view shed. 47
- Fully mitigate the impacts to fish, wildlife, native plans for water diverted out of the Columbia River for the project. 48

Rick Leaumont, Audubon Society

Public Hearing Comments

01 through 13	See Reclamation's responses in the Final Planning Report/EIS.
14	The Integrated Water Resource Management Alternative presented in the December 2008 Supplemental Draft EIS and this Final EIS includes an analysis of floodplain and reach restoration. The integrated approach evaluates the combined effects of the State Alternatives.
15	See Reclamation's responses in the Final Planning Report/EIS.
16	This was evaluated in Ecology's Environmental Impact Statement for the Lake Roosevelt Incremental Storage Releases Project and is being further evaluated in Ecology and Reclamation's Environmental Impact Statement for the Odessa Subarea.
17	This was evaluated in Ecology's Environmental Impact Statement for the Lake Roosevelt Incremental Storage Releases Project.
18	This was evaluated in Ecology's Environmental Impact Statement for the Lake Roosevelt Incremental Storage Releases Project.
19 through 48	See Reclamation's responses in the Final Planning Report/EIS.

CHAPTER 6. COMMENTS AND RESPONSES

Derek I. Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

dsan461@ecy.wa.gov

RE: Yakima Supplemental Draft

Dear Mr. Sandison,

1-1 The Yakama Nation staff submits these comments on the Supplemental Draft Environmental Impact Statement for the Yakima River Basin Water Storage Feasibility Study. We have previously submitted Scoping comments on this SEIS, which we incorporate by reference. We have also commented during scoping and on the Draft Storage Feasibility Study EIS. We believe that any successful effort to solve the problems faced by both instream and out of stream resources will require a package of measures carefully designed to correct the basin's problems where and when they occur. We appreciate this initial effort of the Department of Ecology to put such a package on the table for review and particularly appreciate the inclusion of fish passage, floodplain and side channel restoration, and tributary flow and barrier removal, which the earlier EIS did not address. While there are many technical issues requiring refinement and thorny questions to be answered, this effort represents a step toward fixing the water supply, fish passage, and habitat problems in the Yakima basin.

Inevitably in a multi -faceted approach like this, some components will be ready for implementation before others. Considerable work has been done for instance on fish passage at the storage reservoirs. Acquisition of critical habitat must proceed quickly given the great pressure to convert habitat to other uses. We believe these components that are ready for implementation should proceed immediately and we appreciate the support of the State of Washington for quick action. It is clear from the SEIS that some components will require further refinement before final recommendations and designs can be done. This work must continue, but should not be allowed to delay implementation of those components that are ready to proceed now.

1-2 The segmentation of this process into separate EIS's makes it difficult to see a coherent integrated package. For instance separation of the aquifer storage portion from the discussion of Naches Arm water storage causes this document to fall short of a full

1-2 discussion of storage possibilities. Clearly another step is needed to integrate the integrated package.

Some specific comments and suggested edits (underlined for additions, strikethrough for deletions, passages from Draft SEIS are in quotes) follow.

1-3 **"S.2 …**The specific objectives of the Supplemental Draft EIS are to provide water for irrigated agriculture and municipal water needs and to improve flow, habitat, and access for anadromous and resident fish."

1-4 **"S.3**
"• New or expanded storage reservoirs;
 ○ Options for storing Naches Arm water ~~River storage options~~, including Bumping Lake expansion,"

1-5 Comment: We doubt the utility of including the proposed Pine Hollow reservoir in the SEIS at this time. Pine Hollow is basically limited to Ahtanum Creek, both in the scope of problems to be addressed, and potential benefits and involves a unique set legal and management issues.

1-6 **"S.4 (Second Para.)…** This program would benefit Endangered Species Act-listed spring Chinook salmon and summer and fall Chinook-run Salmon".

We believe this statement is incorrect and that these species, while they are important goals for restoration for the Yakama Nation, are not ESA listed in the Yakima basin. Also, Lamprey are not mentioned in the paragraph, but should be included as a restoration goal of the Yakama Nation.

1-7 **S.5.1**
Comment: This paragraph understates both the level of activity and effectiveness of the components and should be rewritten. Other than the storage component, most of the components of the integrated package are already being pursued at some level by state, federal, Tribal, and local governments and non-governmental organizations, albeit at an unacceptably slow pace. It is certainly not true that such actions

would not result in significant benefits to fish recovery and habitat restoration

as the DSEIS states. Such actions have already had such results. The paragraph should be rewritten to emphasize the advantages of the integrated approach (synergy, speed of implementation, systematic effectiveness, and the inclusion of new storage options) rather than implicitly disparage existing "no-action" actions.

1-8 **"S.5.2.2… Surface Water**
The Integrated Water Resource Management Alternative would have wide-scale geographic and temporal effects ~~benefits~~ on flows throughout the Yakima River basin."

1-9 "…additional flow in the…Naches River…in spring months"

Comment: Probably not.

1-10 "Up to 100,000 acre-feet of water could be retained in a new reservoir for use during drought years by a proratable district such as Roza Irrigation District or Kittitas Reclamation District."

Comment: This is misleading. The 100,000 acre foot number comes specifically a goal provided by the Roza Irrigation District for additional supply for their users. It should not be stated as an overall goal or limitation of new storage and does not take into account potential new supply for out of stream use on the Yakama Reservation.

1-11 "**S.5.2.2… Water Rights…**Operational changes to existing facilities would have a positive impact on the Yakama Nation's water right for instream flow for fish."

Comment: This is misleading. While the SEIS correctly recognizes the Yakama Nation's instream flow right, it is not correct that operational flows define or diminish those rights. We have tried to be clear throughout the discussions of additional storage that a to-be-agreed-upon amount of water made available by additional storage would have to be formally recognized by Congress as being subject to management to benefit fish and other aquatic life in partial fulfillment of the Treaty Water Rights of the Yakama Nation. A flaw in the previous storage study EIS was to treat instream flow improvements as "operational flows" rather than dedicated instream flow water to be managed as such.

1-12 "**S.5.2.2…**The Integrated Water Resource Management Alternative would result in a combination of effects including a reduction of hydroelectric generation at …the two in-line power plants in the WIP."

Comment: It is not clear that this is true.

1-13 "**S.6…**Controversy has been associated with past proposals to expand Bumping Lake."

Comment: This sentence occurs twice in the paragraph.

1-14 "**1.3.2 What's Been Done…**Various projects have been implemented under these programs and plans, including water conservation, habitat improvements, and fish supplementation (hatcheries). Target flows have improved stream flows on the Yakima River below Sunnyside and Prosser Dam~~s and below the reservoirs in winter~~.

Comment: Target flows below the reservoirs are set through the SOAC process, not through the programs listed above. In addition, much work has been done under BPA and SRF Board processes to improve passage and habitat on tributaries. Also, the Interim Operating Plan should be listed among the planning work that has been done.

1-15 "**1.5 Next Steps…**After the separate NEPA and SEPA processes are complete, Ecology and Reclamation anticipate working jointly to identify ways to fund and implement the alternatives identified as feasible in the NEPA and SEPA processes."

Comment: The progress and direction for this integrated alternative came largely from water users and managers other than Ecology and Reclamation, particularly the

1-15 Yakama Nation and Roza Irrigation District. The SEIS leaves the impression, hopefully false that the state and federal agencies will take it from here. Given that the work of fleshing out the final package largely remains to be done, it will be important for the the Yakama Nation and others to be integrally involved in further developments.

1-16 "**2.1 Alternative Development Process…**After receiving comments on the January 2008 Draft Planning Report/EIS (Reclamation and Ecology, 2008), Ecology began working cooperatively with staff from water, fish, and habitat management entities ~~interest groups~~ in the Yakima River basin…"

1-17 "**2.2.1 Yakima River Basin Water Enhancement Project**

Initiated in 1995, the Yakima River Basin Water Enhancement Project (YRBWEP) is jointly funded by Reclamation and Ecology and local matches."

Comment: The current YRBWEP legislation passed in 1994. However, there is previous history of YRBWEP.

1-18 "The Conservation Advisory Group and Reclamation completed the Basin Conservation Plan in 1999 and implementation of conservation measures identified in the plan is ongoing."

1-19 "**2.2.2 Reclamation Improvements to Existing Facilities…**When no surface spill occurs at Roza Dam, downstream migrating fish must either navigate through the fish screen bypass which is located in slackwater with poor attraction flows, or swim deep and encounter high pressures and velocities to pass through a small slot near the bottom of the dam structure."

Comment: Add at end of paragraph: An additional consequence of hydropower diversions at Roza Dam is the dewatering of, at times, a substantial majority of the flow in the bypass reach from Roza Dam to the Roza Powerhouse below the confluence with the Naches. This slows outmigration and affects habitat in the bypass reach. A comprehensive solution to the problem involves subordination of hydropower generation during the outmigration season and correcting the contractual situation that provides a financial incentive to generate power during this period, as well as the structural fix described above. Roza ID has proposed a new power supply contract arrangement to address the subordination issue and their input should be solicited on this component.

1-20 "**2.2.5 Yakima/Klickitat Fisheries Project**

The Yakima/Klickitat Fisheries Project (YKFP) is a joint project of the Yakama Nation and WDFW, and is sponsored in large part by BPA with oversight and guidance from the NPCC. The YKFP is ~~a supplementation~~ project committed to salmon reintroduction through supplementation and habitat protection and restoration. It is designed to use artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and keeping ecological and genetic impacts to non-target species within specified limits. The YKFP is also designed to provide harvest opportunities. The framework developed by the Regional Assessment of Supplementation Project (RASP,1992) guides the planning, implementation, and evaluation of the YKFP."

1-20 Comment: RASP no longer describes the full scope of YKFP. The Subbasin Plan, HSRG, etc guide other non-supplementation components of YKFP.

"The purposes of the YKFP are to enhance existing stocks of anadromous fish in the Yakima and Klickitat River basins while maintaining genetic resources; reintroduce stocks formerly present in the basins; and apply knowledge gained about supplementation throughout the Columbia River basin. Species currently being enhanced in the YKFP and Yakama Nation Fisheries Program include spring, summer and fall Chinook salmon, coho salmon, sockeye salmon, and steelhead trout. A fall Chinook salmon supplementation program began in the Yakima basin in 1983 (Yakama Nation, 2007). Spring Chinook supplementation has been occurring since ~~2000~~ 1997. Coho supplementation in the Yakima basin began in 1995 (Dunningan et al., 2002; Yakama Nation, 2004);however, the Yakama Nation has been releasing hatchery coho in the basin since the mid 1980s. Beginning in 2008, as part of the new summer Chinook program, 250,000 summer Chinook eggs will be incubated for a planned release in spring 2009 (Davis et al., 2008). The Yakama Nation is currently pursuing opportunities to acquire space at existing hatchery facilities to support incubation and rearing of sockeye for reintroduction in the Yakima basin (Johnston, personal communication, 2008). Currently, steelhead are not being artificially supplemented in the Yakima basin. Current efforts to improve steelhead status in the Yakima basin focus on kelt reconditioning (improving the health of salmon that have spawned) and increasing productivity of the existing population through habitat enhancement actions (Reclamation, 2005b; YBFWRB, 2008). The YKFP is currently developing a Master Plan that will assess future enhancement ~~supplementation~~ options (Reclamation, 2008c; YBFWRB, 2008)

1-21 **"2.3.1…** • Fish passage, flow, and habitat enhancements on the mainstem Yakima River and its tributaries.

1-22 **2.3.4.1 Naches River Storage Reservoirs**

Other Potential Water Storage Sites

Reclamation and others have studied a number of additional potential water storage sites in the Naches River basin. Those sites, including Rattlesnake Dam and Horsetail Reservoir, were determined to be not feasible based on the criteria at the time of the studies. Additional studies are needed to determine the most feasible storage opportunities. The studies would include developing a water budget for the basin to determine how much water could be stored without adversely affecting flow needed to maintain fish and other aquatic life~~targets for fish~~. Once the amount of storable water is known, opportunities for providing storage would be evaluated to determine the most cost-effective and feasible type of storage and storage location. Those opportunities may include previously studied reservoir sites or may be new opportunities. New storage opportunities may include storage in the lower basin using existing distribution facilities and piping water for storage in or outside the Naches River basin."

1-22 Comment: The assessment described above needs to be done and questions regarding allocation of newly stored water need to be answered before decisions on storage can be finalized.

1-23 **"Modification of River Operations in Conjunction with Naches River Storage**

Currently the Yakima River reservoirs are operated to provide for spawning and incubation flows, outmigration pulse flows and flushing flows, target flows and diversion entitlements downstream from the dams, and meeting Title XII flows at Sunnyside and Prosser Diversion Dams."

"However, the flip-flop flow regime results in high flows in the ~~mainstream~~ mainstem Yakima River throughout most of the summer, and this is hypothesized to be significantly reducing the rearing capacity for juvenile salmonids"

Comment: This is only partly due to flipflop, and largely due to releases from headwaters reservoirs to meet peak irrigation demand in the lower basin.

1-24 "• Increasing winter and spring flows in the upper Yakima River;"

1-25 **North Branch Option**

Comment: The option to supply Wymer from Cle Elum Reservoir has the potential to unacceptably interfere with the component of juvenile passage at Cle Elum and could work counter to increasing winter and spring flows in the Cle Elum River. All of these factors need to be viewed collectively in an assessment of the pros and cons of each conceptual design.

1-26 **2.3.4.3 Ahtanum Creek Watershed Restoration Program, Including Pine Hollow Reservoir**

Comment: The EIS should make it clear that at this time there is not consensus to proceed with Pine Hollow.

1-27 **3.1.3.1 Bumping Lake Dam**

Comment: EIS should acknowledge that Bumping was a natural lake prior to damming.

1-28 **"3.3.1 Yakima River Basin Reservoirs**

~~The major surface water bodies in the Yakima River basin are the five major reservoirs that are part of the Yakima Project.~~ Five major reservoirs make up the storage component of the Yakima Project."

1-29 **3.3.3.4 Tieton River Reach**

Comment: The EIS should make clear the distinction between effects of flip-flop, and the effects of storage and releases for irrigation. I.e. pre-flip-flop flows in the Upper Mainstem are higher than they would be but for flip-flop and post flip flop flows are lower. The reverse is true for the Tieton and Naches Rivers. With or without flip-flop, flows in the upper mainstem would be lower than natural flow in spring and early summer and higher than natural in late summer. This is an important distinction to draw

1-29 given that "fixing flip-flop" would not fundamentally alter the effects of storage and release for irrigation.

3.3.4 Other Yakima River Tributaries

1-30 Comment: We do not believe the EIS should depend on the report cited, given the fact that many sources of such assessments prepared by basin fisheries experts are available.

3.3.4.5 Wilson Creek

1-31 Comment: This paragraph should note the presence of multiple passage barriers in the Wilson-Naneum system.

Table 3-4

1-32 Comment: Suggest replacing "natural" with "unregulated". Natural connotes free from human interference, which is arguably not the case even above the reservoirs given forest practices, roads, fire suppression, grazing, and other influences. Unregulated simply connotes the absence of storage, releases, and diversions.

3.4 Water Rights

1-33 Comment: Section 3.4.2.1 makes a number of statements about the Nation's rights in Acquavella on Ahtanum. We have not thoroughly reviewed the narrative about water rights in this section and elsewhere in the DSEIS. Lack of specific comment nor silence by the Yakama Nation does not signify acceptance of this narrative nor agreement that it correctly describes the water rights nor other legal rights of anyone. The rulings and orders of the courts and positions taken by the parties in this litigation are what they are and cannot be changed or modified by this section or other sections of the DSEIS nor by comment nor lack thereof on this section or others. While reserving comment on the remainder we note that *Acquavella* only determined surface water rights and did not litigate groundwater rights; that the Nation has a water right for not only fish life but also other aquatic life; that the Court has rejected the AID claim to retain stockwater as summarized by the below document; and that the Nation otherwise incorporates its briefs and litigate position on these points from *Acquavella* into these statements.

"3.4.3 Ground Water Rights…

1-34 The relationship between ground water and surface water is important to managing the water resources and making decisions regarding potential impairment of existing rights by new rights. Flowing groundwater discharges to surface water (or to the atmosphere through evapotranspiration). ~~In areas where there is hydraulic continuity (an exchange of water) between a ground water system and a surface water body, pumping~~ Pumping and consumptively using groundwater ~~may potentially reduce~~ reduces ground water discharge into surface water, or ~~in extreme cases, divert~~ induces recharge from surface water into a ground water system, thereby reducing flows in surface waters. This could affect established water rights to the surface water source and instream flows for fish~~. In the few areas where hydraulic continuity does not exist, ground water may be withdrawn with no effect on surface waters.~~ Management of surface waters can also affect the ground water supply. In areas where irrigation occurs, part of the ~~return flow~~ applied irrigation water percolates into the ground and recharges the aquifers. If conservation measures are

1-34 implemented, this may reduce the amount and/or location of recharge to ground water and in turn reduce discharge to surface waters."

1-35 "**3.8.1.4 Yakima River Tributaries…**Wetlands are common along Toppenish and Satus Creeks due to their low gradient and braided channels and through extensive wetland restoration efforts by the Yakama Nation."

3.9.1.2 Distribution of Steelhead and Salmon

1-36 Comment: Cowiche Creek contains at least one partial barrier near its confluence with the Naches.

1-37 **"3.9.1.4 Habitat Conditions for Anadromous Fish…Flow Conditions…**Flow conditions above the reservoirs typically remain unaltered by storage, release and diversion with ~~historic~~ unregulated flow regimes. Any effects of land use practices on the hydrographs has not generally been quantified.

Comment: Reclamation has studied Gold Creek and concluded that reservoir drawdowns are not responsible for the dewatering in the vicinity of Gold Creek pond and that the existence of the pond (gravel pit) may be responsible.

Comment: The Yakama Nation is working on restoration of Lamprey. This species is not discussed.

5.2 Climate Change

1-38 Comment: An expanded discussion of how climate change is expected to affect hydrology, i.e. earlier higher peak flows, lower summer flows and how these changes interact with the components of the proposed package would be helpful. It is generally insufficient to say storage would "improve streamflows". Rather it changes the distribution of streamflow over time. Likewise climate change is expected to alter timing more than the overall budget. The EIS should relate the two.

5.2.2.3 New Storage Element

1-39 Comment: The EIS should not overstate the thermal benefits of headwaters storage. River-floodplain interactions and riparian health are probably more important to temperature than bulk cooling by summer storage releases.

"5.3.2.3 New Storage Element
Naches River Storage Reservoirs
Bumping Lake Expansion – Large Option
Reservoir Storage Capacity

1-40 The Bumping Lake enlargement option would change the storage capacity for Bumping Lake from 33,700 acre-feet to 458,000 acre-feet. Of this additional 424,300 acre-feet, 100,000 acre-feet would be used to enhance proratable irrigation during dry years and 324,300 acre-feet would be used for fish enhancement purposes."

Comment: This is misleading and is based on incomplete discussions and agreements. The 100,000 acre feet is a specific proposal made by the Roza Irrigation District, who envision the 100,000 acre feet as carry over only to be used in prorationing

years. The 100,000 acre feet is a statement by Roza of their needs and does not include
1-40 other proratable water right holders or possible additional water for the Yakama
Reservation. Such questions of allocation of storage require further discussion.

Bumping Lake Expansion – Large Option
"The specific uses for the additional storage water would be dependent on flow and water supply conditions and would be determined by a management team consisting of
1-41 representatives from Reclamation, the Yakama Nation, major irrigators, and fish agencies."

Comment: Many of these questions would need to be answered in advance of constructing additional storage, rather than after the fact.

"Water Available for Storage
Using this assumption for the minimum instream flow requirement for Bumping River, the average annual volume available for storage was 117,100 acre-feet from 1981 to 2005. In 1997, the volume available for storage was 239,300 acre-feet. In 2001, the volume available for storage was 41,600 acre-feet."

1-42 Comment: The EIS should draw the distinction between water entering storage in a given year and the amount of storage available for use. In the carry over model proposed by Roza, for example, 41,600 would be available to be stored in 2001, but more would be available for use from previous years. The paragraph could be misread to mean that in 2001, only 41,600 acre feet would have been available for use from storage.

Page 5-16
"In order to maintain instream flows in the lower Yakima River ~~as required by court orders and federal legislation,~~ Title XII flows set ~~minimum~~ initial target flows on the
1-43 Yakima River below Sunnyside Dam (Parker gage) and below Prosser Dam. These initial target flows are intended to increase proportionally as conservation and water acquisition is done under Title XII." Some increases to the initial target flows have occurred.

Page 5-25 **Wymer Reservoir**
North Branch Option
Comment: It is critically important that any options for filling Wymer from Cle Elum Reservoir not affect the planned outmigration facilities at Cle Elum, which are dependent on reservoir level. Also, reduction of Yakima River flows in spring is not helpful. Only
1-44 after the two hydrographs cross (unregulated and observed, i.e. regulated flows are higher than unregulated) would reduction in upper Yakima flows be viewed as positive. It should be made clear that any reduction of flows in the Cle Elum River or upper Yakima could only be characterized as a fish benefit during those months of unnaturally high flow.

Ahtanum Creek Watershed Restoration Program, Including Pine Hollow Reservoir
1-45 Comment: Resolution of issues surrounding the Pine Hollow reservoir is a separate conversation and process involving different parties than the rest of the discussion in the SEIS.

"**5.4.2.3 New Storage Element…**Water released for instream flow would be transferred to the state Trust Water Rights Program and the certificate held by
1-46 the state (RCW 90.38.040)."

Comment: This would not apply to instream flow under the Yakama Nation's Treaty Rights.

5.9.2.3 New Storage Element
Comment: The SEIS perpetuates the indiscriminate use of several poorly defined or undefined terms regarding flow.
"Normalizing fall flow regimes in the Tieton and Naches Rivers would benefit juvenile spring Chinook"
Comment: Normalizing is a statistical hydrologic exercise to relate an incompletely
1-47 gaged watershed to one with a better record. If the EIS means to say "restoring natural flow conditions", it should say so. If it means restoring "normative" conditions, it should define the term.
"Concerns exist regarding the potential for negatively affecting what are now mostly naturalized flows in the Naches River basin as a result of expanding water storage."
Comment: Naturalizing is the process of turning foreigner into a citizen. "Unregulated" is probably a better word.

Comment (general on Bumping): Although the SEIS chooses to discuss mostly the impacts associated with the large Bumping, given the relative amount of storable water compared to reservoir size, the SEIS would do well to carefully evaluate the relative
1-48 increases of usable water budget for both large and small options and evaluate the impacts of the smaller option, which would presumably involve less inundation of habitat and less costly fish passage facilities.

"**5.10.2.3 New Storage Element…**New recreational facilities would be constructed,
1-49 but would likely take many years to be finished after completion of the Bumping Lake expansion project."

Comment: On what is "many years" based?

"**5.17.2.1 Fish Passage Element**
The proposed fish passage elements would be located in landscape settings where visual character and scenic quality are high."

1-50 Comment: The location of fish passage would be in the landscape settings of dams, where the visible character is dams and associated works and the scenic quality is as such. The SEIS should not exaggerate the change in the scenic quality of a dam associated with adding fish passage to it.

1-51 Thank you for the opportunity to comment. We appreciate Ecology's responsiveness to the call by us and others to provide for consideration an integrated approach. I look

1-51 forward to working with you on refining the package and moving ahead with implementation. Please contact me or my staff with any questions.

Sincerely,

Philip Rigdon, Deputy Director for Natural Resources
Yakama Nation

Comment Letter No. 1 – Yakama Indian Nation – Phil Rigdon

1-1	Comment noted. Your scoping comments and your comments on the January 2008 Draft Planning Report/EIS were used to help shape the options considered in the Integrated Water Resource Management Alternative in this EIS.
1-2	Comment noted. This Final EIS has incorporated the State Alternatives, including ground water storage, into the Integrated Water Resource Management Alternative.
1-3	The objectives for the project are based on Ecology's authorization for the Storage Study. Those objectives are to provide additional water supplies for irrigated agriculture and future municipal needs and to improve habitat for resident and anadromous fish. See Section 1.2.1.2 of the January 2008 Draft Planning Report/EIS for a discussion of state authority to participate in the Storage Study. Ecology agrees that improving access for fish is an important goal and has incorporated fish passage projects into the Integrated Water Resource Management Alternative.
1-4	The style change was not made to be consistent with the other bullets in the list. The word "basin" was added to clarify that a range of storage options are being considered in the Naches River basin.
1-5	Comment noted. Although the benefits of Pine Hollow reservoir would primarily be limited to Ahtanum Creek, the project was included as an example of a subbasin approach to water storage.
1-6	Section S.4 has been corrected in the Final EIS per your suggestions.
1-7	The paragraph has been revised in the Final EIS to emphasize the advantages of an integrated approach.
1-8	The text was revised from "benefits" to "effects" in the Final EIS.
1-9	This section has been revised to reflect the new modeling results.
1-10	The text in the Final EIS has been revised to reflect the comment.
1-11	Comment noted. The sentence referring to operational flows and the Yakama Nation's water right for instream flow has been deleted.
1-12	Comment noted. A more detailed analysis of the impacts on hydropower production was not conducted for the Final EIS; however, in general terms a reduction in flow in the WIP Canal could reduce hydropower production.
1-13	The repeated sentence has been deleted from the Final EIS.
1-14	The paragraph has been revised to include your suggestions and clarify that the projects and plans that have benefited fish in the Yakima basin are not limited to those listed.
1-15	Comment noted. The statement you quote refers to how Ecology and Reclamation will proceed after their separate environmental documents are prepared. The statement was not intended to imply that the agencies would continue without the Yakama Nation and other water users. The Next Steps section of the Final EIS has been revised to include more specific steps about implementation of the Integrated Water Resource Management Alternative.
1-16	The Final EIS text has been revised per your suggestion.
1-17	Text has been added to the Final EIS regarding local matches. Your comment is noted regarding previous history of YRBWEP. That history is described in the sections of the January 2008 Draft Planning Report/EIS referenced in this section.
1-18	The Final EIS text has been revised per your suggestion.

1-19	The Final EIS text has been revised per your first comment. Subordination of the Roza Power Plant is proposed as part of the Integrated Water Resource Management Alternative.
1-20	The text in the Final EIS has been revised per your suggestions.
1-21	The text in the Final EIS has been revised per your suggestion.
1-22	The section where you suggest changes has been deleted from this Final EIS. Your comment regarding the need for additional assessment of storage projects before decisions on storage are finalized is noted. This Final EIS includes additional modeling of the amount of storable water. Additional analysis would be needed as described in Section S.7 of this Final EIS.
1-23	The text in the Final EIS has been revised per your suggestions.
1-24	The section where you suggest changes has been deleted from this Final EIS.
1-25	Comment noted. It is recognized that this option would need to be operated so that juvenile passage at Cle Elum Dam would not be affected and winter and spring flows would not be adversely impacted.
1-26	The statement you suggest about consensus about Pine Hollow reservoir has been added to the text of the Final EIS.
1-27	The text of the Final EIS has been revised per your suggestion.
1-28	The text of the Final EIS has been revised per your suggestion.
1-29	The text of the Final EIS has been revised per your comment.
1-30	The text in Section 3.3.4 has been revised in the Final EIS using additional sources.
1-31	Passage barriers are described in Section 3.9.1.2, Distribution of Salmon and Steelhead.
1-32	The text of the Final EIS has been revised per your suggestion to change the term "natural" to "unregulated".
1-33	Comment noted. It is not the intent of this EIS to change or modify rulings or orders of the Adjudication Court or positions taken by the parties in the Adjudication, nor can the document do so. The purpose of this discussion is to summarize the Court's rulings to date in the Ahtanum hearings.
1-34	In your comment you provided redline corrections to the text. We accepted the suggested change regarding use of the term "return flow" and we have modified the sentence regarding areas where hydraulic continuity is not present. We believe the remainder of the paragraph is accurate as written.
1-35	The Yakama Nation's wetland restoration program was added to the paragraph in the Final EIS.
1-36	Information on Cowiche Creek fish passage has been corrected in Section 3.9.1.2 and Appendix C of the Final EIS.
1-37	The Final EIS text on flow regime was revised to address your comment. Information about Pacific lamprey has been added to the Final EIS text where appropriate.
1-38	Comment noted. Additional information about the expected effect of climate change on hydrology in the Yakima River basin has been added to Section 3.1.
1-39	Comment noted.
1-40	The Final EIS text has been revised to better clarify that storage allocations have yet to be decided.
1-41	Comment noted.

1-42	Comment noted. The section was revised for clarification and to present additional analysis completed using the RiverWare model.
1-43	The Bumping Lake Expansion sections of the Final EIS have been completely revised to included updated information and the model results from RiverWare. The text where you suggest changes has been rewritten.
1-44	Comment noted. The Final EIS text has been revised.
1-45	Comment noted. See the response to your Comment 1-26.
1-46	Comment noted.
1-47	The text in the Final EIS has been revised so that the terminology used to describe flows is consistent. "Unregulated" is used to describe the current flow regime in river basins without storage. The specific text in your comment was changed to "restoring a more natural flow fall flow regime."
1-48	Comment noted. More discussion of the Bumping Lake option is provided in the Final EIS.
1-49	The paragraph has been revised in the Final EIS to clarify the duration of completion of recreational facilities. Additional analysis of impacts to recreational facilities would be conducted as part of project-level environmental analysis if the expansion of Bumping Lake is carried forward.
1-50	Comment noted. A sentence has been added to the introductory paragraph noting that the visual character and scenic quality of the immediate dam areas has been altered by human activities. As noted in the following paragraphs, the addition of fish passage facilities is not expected to be distinguishable from other dam facilities in most situations.
1-51	Comment noted.

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Northwest Regional Office
911 N.E. 11th Avenue
Portland, Oregon 97232-4169

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
Regional Director

JAN 16 2009

Mr. Derek I. Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, Washington 98902-3452

Dear Mr. Sandison:

2-1 Thank you for the opportunity to comment on the Yakima Supplemental Draft Environmental Impact Statement (EIS). The Bureau of Indian Affairs (BIA) applauds looking at a "broad range of alternatives" that will address multiple facets of water resource problems in the Yakima River basin. The BIA believes the EIS falls short of its intended purpose to identify feasible alternatives (elements) as an "Integrated Water Resource Alternative" (IWRA).

The EIS is a step toward protecting natural resources for future generations and provide some solutions, but not the best solutions given the existing information and science. The solutions that hold us over until the next generation can think of a better way to improve the system. The BIA believes the IWRA should be modified to include a better mix of available alternatives, and that the EIS is therefore incomplete.

The Supplemental Draft EIS broadly evaluates <u>some</u> alternatives and lists a variety of elements that <u>might</u> address multiple facets of water resource problems in the Yakima River basin. The EIS groups the broad range of alternatives (proposed elements) together and calls them an "Integrated Water Resource Alternative" (IWRA). The EIS labels the alternatives as "feasible." The EIS states that Washington State Department of Ecology and U.S. Bureau of Reclamation anticipate working jointly to identify ways to implement and fund the alternatives identified as feasible in the NEPA and SEPA process.

2-2 To best use available funding, the BIA believes that the "proposed elements" of the IWRA should have been ranked by priority based on good science, cost/benefit, short term impact, long term impact, likelihood of litigation – issues likely to result in no chance of construction, likelihood of receiving funding, multiple step projects (one step builds on success of the preceding step), projects with good fish and lamprey passage as a criteria and projects that are already designed/engineered with buy in from all parties involved including the public only pending funding. The BIA believes that if such an evaluation process was used to select the composition of the IWRA, the likelihood of overall success of the IWRA would be greater. For

2-2 example, to get something on the ground and with sound reasoning, the IWRA should have been able to recommend construction of a small Bumping Reservoir project instead of, or as an alternate to, the large Bumping Reservoir project.

2-3 The EIS specifically fails to consider fish passage as a desired ultimate goal. Despite lack of funding at any given time, fish and lamprey passage opportunities should be identified goals of any IWRA. Further, the idea of "trap and haul" should only be considered as an interim solution, not an end itself. Further, the EIS does not appear to address "species of concern," such as the lamprey. Because Reclamation is currently studying "drum screens" for potential adverse impacts to lamprey ammocete (larval stage of a lamprey) the IWRA selection process should consider issues or benefits identified in ongoing investigative studies. Additionally, the EIS should address the manner in which the alternatives will have continued testing for out migration success and proven upstream passage.

2-4 The first element of the IWRA includes fish passage at existing reservoirs but does not break out priorities. The BIA believes ranking the reservoirs by agreed criteria would focus time, money, effort, and would greatly improve the levels of success.

2-5 A second element of the IWRA includes structural and operational changes to existing facilities. This element should be ranked so as to look at and identify the most likely to be successful with the least amount of conflict, at the lowest cost, etc.

2-6 The third element "new or expanded storage reservoirs" should be prioritized on an agreed ranking or rating system. Some identified reservoirs have a greater chance of success than others.

2-7 The fourth element of the IWRA concerns "Fish habitat enhancement on the mainstem Yakima River and its tributaries." Again, these are good goals but ranking or rating as to priority would improve the chance of success and better spend available funding.

2-8 The BIA agrees that given the state of natural resources in the Yakima River basin, time is of the essence. However, the BIA believes taking time to develop a weighted or ranked "Integrated Water Resource Alternative" would have a better chance of long term success.

2-8 The EIS – Yakima River Basin Water Storage Feasibility Study Supplemental Draft is a programmatic evaluation that needs some additional refinement to focus the proposed elements contained in this letter. We look forward to your response, and appreciate the opportunity to provide this input.

Sincerely,

Northwest Regional Director

cc:
Yakama Nation
CRITFC

Comment Letter No. 2 – Bureau of Indian Affairs, Northwest Region

2-1	Comment noted.
2-2	Comment noted. The Draft Supplemental EIS and this Final EIS are programmatic documents intended to identify the range of impacts that could be associated with the proposed alternative. As described in the Master Response and in Section S.7 of the Final EIS, additional environmental analysis and prioritization will take place as projects are carried forward. As described in Section S.5, Ecology and Reclamation are moving forward with development of an implementation plan for the Integrated Water Resource management Alternative. The implementation plan will include a system for prioritizing projects based on the general types of criteria presented in Section S.5..
2-3	Although fish passage is not a stated goal of the Integrated Water Resource Management Alternative, improving fish habitat is a stated goal and the alternative includes fish passage. Fish passage is presented in Chapter 2 and evaluated in Chapters 4 and 5. Reclamation and Ecology, in cooperation with the Yakama Nation, are preparing a NEPA/SEPA EIS to evaluate the specific impacts of fish passage facilities and fish reintroduction at Cle Elum Dam. The issues you raise will be evaluated in that document for Cle Elum Dam. Specific impacts of other fish passage facilities will be evaluated in future environmental documents when those projects are carried forward.
2-4	Section 2.3.2 states that the Yakima River basin dams are listed in order of priority for implementation—Cle Elum, Bumping Lake, Tieton, Keechelus, and Kachess.
2-5	See the response to your Comment 2-2 regarding prioritization of projects.
2-6	See the response to your Comment 2-2 regarding prioritization of projects.
2-7	See the response to your Comment 2-2 regarding prioritization of projects.
2-8	Comment noted.

Derek I. Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

Re: Comments on the draft Supplement Environmental Impact Statement for the Yakima River Basin Water Storage Feasibility Study

Dear Mr. Sandison,

3-1 The subject document represents a substantial step forward in evaluating potential water resource solutions for the Yakima basin. We believe that further refining the Integrated Water Resource Alternative is a crucial step in moving us forward toward ultimately implementing actions to help solve some the water resource problems we face in the Yakima basin. Since many of the elements identified as potential actions in the Integrated Water Resource Alternative involve Reclamation facilities or operations we are ready to assist in refining that alternative, to the extent our resources allow. We view this effort as ultimately leading to the next phase of the Yakima River Basin Water Enhancement Project.

We have reviewed the subject document and have the following general comments.

3-2 The supplemental draft EIS is written at a fairly general level and is substantially programmatic in nature. Given the programmatic scale of the analysis it is difficult to assess the magnitude of the various impacts and benefits and try and determine to what extent the various elements help reach the study goals. As part of the process it might be worthwhile to again visit the issue of what goals for fish habitat, irrigation and municipal water supply are acceptable to the various stakeholders. Then, prior to determining what elements should be considered for inclusion within the Integrated Water Resource Management Alternative, implementation objectives and priorities should be defined to assist in meeting the goals.

3-3 For the fish habitat goal this would likely involve defining the objectives and priorities on a geographic basis. With respect to the fish habitat goal, we recognize that the three key restoration components of water storage, habitat restoration/preservation and fish passage have been identified. However, there still appears to be a need to find some level of consensus amongst the stakeholders on specific objectives in various parts of the basin and the relative priority of those objectives. The lack of objectives is not well defined with respect to the storage element, which includes alternatives ranging from the Black Rock Alternative to small Bumping Lake enlargement. It also is not clear how storage fits in with the overall fish habitat goal.

3-4 The fish passage and habitat restoration/preservation elements are more clearly defined, but could benefit from better coordination between the ongoing programs (cited in section 2.2). A structured process is needed to gather input from other entities currently

3-4 working "on-the-ground" on how this process might complement their ongoing efforts. We agree that it is important to maintain the existing fish passage and restoration/preservation programs that are currently in place and working well. In addition, we would like to determine how to help them do their job more efficiently and integrate or account for those programs in the comprehensive plan for the Yakima Basin.

3-5 As noted above the programmatic nature of the document makes if difficult to assess the benefits or impacts of some of the proposed elements. This appears to be particularly true for some of the proposed storage elements. For example, in the discussion of enlarging Bumping Lake, the possibility for making annual releases of "fish water" for five different purposes is identified. To what extent these releases may be mutually exclusive or at least would impact one another is difficult to tell. For example, if stored water is used on an annual basis to increase spring flows in the upper Yakima, how would this affect the ability to use it to offset September flows from Rimrock or allow for more flexibility in managing winter flows elsewhere in the basin? What tradeoffs would have to be made to use it for one purpose versus another?

3-6 The relative magnitude of the potential impacts or benefits of the alternative is also difficult to evaluate. On an average annual basis the runoff at Bumping Lake is estimated at about 69,500 acre-feet while at Wymer, based on numbers in the Yakima River Basin Water Storage Study Feasibility Final Planning Report/Environmental Impact Study (Final PR/EIS), it appears that the average annual storable volume might be as high as about 130,000 acre-feet. At Wymer the actual amount of average annual storage is tempered by the location of the diversion and its capacity. While at Bumping it is unclear how much of the annual runoff would be considered outside of the current TWSA calculation and, therefore available for storage and use on an average annual basis. Without knowing the size of the average annual "bucket" of fish water it is impossible to assess the benefits of the various annual operations that are identified. Prior to moving forward with the evaluation of the storage elements more detailed analysis, including some system modeling, will be needed so the relative magnitude of the potential impacts and benefits can be assessed.

3-7 The need for more detail is necessary with respect to how additional storage would be operated to meet irrigation needs in order to adequately assess benefits. Some of the questions that would need to be addressed are:

1. How will stored water be allocated between the potential district(s), which are listed as Roza and Kittitas Irrigation districts?
2. How will stored water be allocated between irrigation and instream flow needs when there less than a full supply?
3. What administrative mechanisms would be used to move water "upstream" from Bumping Lake to KRD?

3-8 Finally, one of the conclusions in the Final PR/EIS was that the most significant fishery benefit of new storage, as modeled in that study, was improved out-migrant survival. This life stage is not identified in the summary tables (tables 5-19 through 22) in the

3-8 section 5.9. Inclusion of the smolt lifestage in the analysis would be beneficial since some of the stated elements, which may otherwise have few benefits, would benefit out-migrant survival. Inclusion of the smolt lifestage would allow for a comparison of smolt survival benefits between the SEIS and the Final PR/EIS for a specific restoration action.

If you have any questions concerning these comments please contact Joel Hubble at (509) 575-5848 extension 371.

Comment Letter No. 3 – U.S. Bureau of Reclamation – Joel Hubble

3-1	Comment noted.
3-2	Comment noted. Ecology is working with Reclamation and other water and fish interests in the Yakima basin to develop an implementation plan for the Integrated Water Resource Management Alternative. That implementation plan will include prioritizing projects. See Section S.5 of this Final EIS.
3-3	Comment noted. See the response to your Comment 3-2.
3-4	Section 2.2 in the Final EIS has been revised to clarify the coordination with ongoing projects.
3-5	Additional modeling was conducted for this Final EIS and additional information has been added about water availability from storage. However, the document is still programmatic and additional analysis would be required to determine potential impacts.
3-6	Modeling and additional analyses have been included in the Final EIS.
3-7	The modeling that was conducted for the Final EIS used assumptions about the allocation of water from new storage. Those assumptions are explained in Section 5.3. However, as noted in Section 5.3.2.1, the actual allocation of water would be dependent on flow and water supply conditions and would be determined by a management team consisting of representatives from Reclamation, the Yakama Nation, major irrigators, and fish agencies. The question about what administrative mechanism would be used to move water "upstream" has not yet been addressed, but would need to be before deciding to build a new storage project.
3-8	Smolt out-migrant survival has been added to the tables in Section 5.9.

Washington Department of FISH and WILDLIFE
Region 3 Headquarters
1701 South 24th Ave., Yakima, Washington 98902

January 15, 2009

Derek I. Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

SUBJECT: Review Comments – Yakima River Basin Water Storage Feasibility Study – Supplemental Draft SEPA Environmental Impact Statement (SDEIS)

Dear Mr. Sandison:

4-1 In the Washington Department of Fish and Wildlife's (WDFW) July 30, 2008 scoping comments for the Yakima Basin Water Storage Feasibility Study SDEIS, we emphasized the importance of taking a watershed approach and proposing a broad suite of actions for funding and implementation as an integrated package, rather than individual components implemented in a "piece-meal" fashion. WDFW appreciates that the Department of Ecology (DOE) followed this suggestion in developing the preferred alternative, Alternative 2 – Integrated Water Resource Management. We also want to thank you for the opportunity for WDFW staff to work with you and your consultants in developing the comprehensive package of fish passage, system operational and fish habitat elements included in the preferred alternative.

General Comments:

The Integrated Water Resource Management Alternative (IWRMA) appears to be in sync with flow and resource restoration plans and programs already proposed for the Yakima Basin. That validates the IWRMA. Each of the four major elements has tangible fish benefits. Absent the potential terrestrial wildlife impacts from the largest Bumping Lake expansion proposal, the remaining proposed concepts could produce large gains in ecological function and instream habitat.

4-2 The SDEIS would benefit from a table(s) to quantitatively illustrate predicted flow improvements (increases or reduction in cfs) by reach by season—and in average, wet and drought year scenarios. However, we realize that it may be difficult to provide that level of detail in this programmatic EIS. At some point, a quantitative assessment of the basin-wide fish flow improvements under the IWRMA must be provided.

4-3 The document represents municipalities as a beneficiary of Reclamation water projects. Typically federal contracts target the agricultural community, not municipalities. Kennewick

4-3 Irrigation District (KID) is one exception, but in planning projects, the USBOR often states municipalities cannot use the federal water. This should be clarified or explained.

4-4 In general, the concept of using KRD water to replace diversions from tributaries in the Kittitas Valley is an excellent habitat improvement strategy that WDFW supports. The list of streams and steam reaches that could benefit would expand if normative flow restoration is the primary goal rather than just supplementation of summer low flows. Several drainages and streams currently do not experience summer low flow problems because of irrigation return flows. The management of the return flow infrastructure and the flows themselves should strive towards normative flow restoration, in even the lower reaches. In developing costs estimates for using the KRD water, the return flow management scenarios needs to be incorporated.

4-5 All the storage reservoirs inhibit downstream recruitment of bedload material and large woody debris (LDW). There should be consideration (possibly as compensatory mitigation) to supply bedload material and LDW into the rivers to offset the loss of these stream channel functions. The Tieton River is an extreme example of how the loss of fine-to-coarse gravel and small cobbles limits spawning opportunities, even if large salmonids are present. The idea is not unprecedented and is practiced on a smaller scale in small streams throughout the basin and the state.

Specific Comments (by page, section, topic) follow below:

4-6 **Page FS-1**: Correct the dates and agencies on the bottom of the fact sheet. The SEPA SDEIS was issued on 12/10/08. The NEPA Final EIS/PR was issued on 12/19/08 (not 12/10) by Reclamation (not Ecology). The figure on Page S-1 is correct.

4-7 **Page S-3, Paragraph 2**: Spring chinook are not ESA-listed.

4-8 **Page S-14, Socioeconomics:** "Most costs would be borne by taxpayers and benefits would be <u>realized only by those who value improved fish populations</u> or irrigators who received a more reliable water supply, for example." Broaden the scope of those who will benefit from the elements of the Integrated Water Resource Management Alternative. Returning ecosystems toward natural functions will also improve the quality of life for those that live and utilize the area. The sentence found in the Distribution of Costs and Benefits section of New Storage Element on page 5-100 would be appropriate in the Summary… "The costs and benefits would coincide insofar as taxpayers pay the costs and realize the benefits of better health for ecosystem resources owned by all citizens."

4-9 **Page S-15, S.6 - Areas of Significant Controversy and Uncertainty: "**Controversy has been associated with past proposals to expand Bumping Lake." Remove the duplicate sentence in this paragraph. The word "stage" in Paragraph 3, Line 6 should actually be "storage".

4-10 **Page 1-1, Sec. 1.1 Introduction:** Will this be a programmatic EIS similar to the Final Programmatic Environmental Impact Statement for the Columbia River Water Management Program?

4-10 Please clarify throughout the document whether you are referring to a state and/or federal EIS. On page 1-6 "Final SEPA EIS" was utilized and should be carried throughout the document.

4-11 **Page 1-5, Sec. 1.2 - Purpose and Objectives:** "In most years, summer flows in the Wapato reach and immediately downstream from Prosser Diversion Dam to Chandler Power Plant are less than ideal for maintaining salmonid habitat and riparian function." Less than ideal is very subjective. How is the reach less than ideal for maintaining salmonid habitat and riparian function? Are flows too low, temperatures too warm, or flows not dependable to maintain salmonid refuge areas?

4-12 **Page 1-9, Sec. 1.3.1 - Water Resource Problems in the Yakima River Basin:** The first reference to recent adult steelhead returns of 6,700 to 37,000 fish is a reference to all adult salmonid returns during the 1997-2006 period, not just steelhead. The second reference to steelhead returns in the same paragraph is correct… "Between 1985 and 2008, the numbers of returning adults ranged from 450 to 4,491".

4-13 **Page 2-13**: Neither spring or fall chinook are listed under ESA in this basin. Summer chinook currently do not exist (extirpated like sockeye), but are the subject of a reintroduction feasibility study that began recently. Coho are in the process of being re-established as a naturally reproducing species in the basin. Only steelhead and bull trout are listed under ESA in this basin.

4-14 **Page 2-14, Cle Elum Dam**: Interim (i.e. temporary) downstream fish passage facilities do exist at Cle Elum Dam. Reclamation modified one spillway gate, constructed a wooden passage flume and installed two PIT-tag detectors several years ago to test the feasibility of attracting and safely passing salmon smolts over the dam. This facility works reasonably well, but is limited to a narrow window when the reservoir is high enough to allow water to be released down the spillway. The timing of this smolt passage window may not coincide with the "biological clock" telling salmon smolts when to migrate downstream (i.e., the reservoir may fill late in the spring after the optimal time for smolt passage through the lower Yakima River). The proposed, multi-level downstream fish passage structure, accurately described in this section, eliminates this problem by allowing passage to begin at a much lower reservoir elevation and continue as the lake refills. Currently, there are no upstream passage fish passage facilities at the dam.

4-15 **Page 2-15, 2.3.2 Fish Passage Element - Cle Elum Dam:** Reclamation determined that a multi-level intake for the Cle Elum downstream migrant facilities was technically feasible---but not in the January 2008 Storage Feasibility Study PR/EIS. The correct reference is to Reclamation's September 2008 Draft PR for the Storage Dam Fish Passage Feasibility Study. The same applies to the reference regarding fish passage facilities at Bumping Dam.

4-16 **Page 2-16, Para. 2**: The lowest 0.5 miles of Deep Creek does not go subsurface (dry). This area is always watered and is used by bull trout for spawning and as a migration corridor to upstream spawning areas. There are two areas that do go dry in below average water years. The lowest site is about 1.5 miles upstream from the creek mouth at Bumping Lake. The other is further upstream beginning about 1 mile above the mouth of Copper Creek.

4-17 **Page 2-16, Tieton Dam**: Rimrock Lake historically did not exist---there was no ancestral lake.

4-17 The mainstem Tieton River and the North and South Forks of the Tieton rivers and their tributaries supported spring chinook, steelhead, coho and fluvial (river-dwelling) bull trout.

Salmonids are subject to entrainment in the unscreened Tieton Dam outlet works. Vestigial runs of spring chinook and steelhead do exist in the Tieton River based on observations of adult fish or redds by WDFW and Yakama Nation biologists. Kokanee and adfluvial bull trout do reside in Tieton Reservoir, and they are the most abundant and healthy populations of these two resident species in the Yakima Basin.

4-18 Include improving upstream passage at **Clear Lake Dam and/or spillway** in Section 2.3.2. The recent discovery (2006) of a significant spawning population of bull trout in the upper North Fork Tieton River has lead WDFW, USFWS, USFS and Reclamation fish biologists to question if Rimrock Reservoir adfluvial fish are able to find a migration pathway over the spillway cascade at certain flows. These biologists do not believe these spawners are residing in Clear Lake, but are moving upstream from Rimrock Lake. Even if some fish are able to swim up the spillway under certain flows, WDFW Fish Program staff believes that modifications to the basalt ledge cascade can be made to improve upstream passage over a wider range of flows.

4-19 **Page 2-17, Keechelus Dam**: In addition to bull trout, other resident species inhabiting the reservoir and tributaries include rainbow trout and kokanee. Kokanee spawn in Gold Creek and Coal Creek.

4-20 **Page 2-18, Kachess Dam**: Kokanee are also found in Kachess Reservoir.

4-21 **Page 2-19, Structural Changes, Para 2**: Change "diversion" to "Division" after the word "Satus" (i.e., …"move the point of diversion for the Satus Division from Wapato Dam to a new pump station near Granger"…).

4-22 **Page 2-25, Bumping Lake Expansion – Large Option, Para. 2**: This paragraph is vague about how the operating requirements in the "Integrated Water Resource Mgmt." Alternative (Alt. 2) would differ from what Reclamation proposed in their Draft Planning Report/NEPA EIS. A side-by-side, comparative discussion of the operations under the two approaches should be provided to assess the relative merits of the two alternatives for operating an enlarged Bumping Lake for fish and irrigation.

4-23 **Small Option**: Show the inundation line for the 200 KAF enlargement option on Figure 2-4 so readers can compare the large and small options. Crop the figure to eliminate extraneous area (e.g. North Fork Rattlesnake Creek) and enlarge the center of the figure to better show Bumping Lake at full pool elevation for the existing size, 200 KAF and 458 KAF.

4-24 **Page 2-26, Modification of River Operations in Conjunction with Naches River Storage, Para. 2**: The comment that the majority of Naches Basin streams have a relatively unregulated flow regime is true and significant. Much of the basin has a highly "normative" flow regime, with the exception of the Tieton River below Rimrock Reservoir. This would change if Bumping Lake Expansion occurs. The Naches River side would become more regulated, which could

4-24 have negative effects. This section lists a number of potential fisheries flow benefits that could be implemented with new Naches Basin storage. Acknowledge that these benefits do not come without a potential cost to the Bumping River and Naches River flow regime by increasing the level of regulation.

4-25 **Page 2-34, Table 2-2**: Consider Wenas Creek for flow and fish habitat restoration options. Wenas Creek has a large Reclamation YRBWEP acquisition/restoration project near the creek mouth and is good location for future flow/habitat improvement projects.

4-26 **Page 3-8, Figure 3-3:** Correct references to Figure 3-3. Figure 3-3 is a Bumping Lake recreation map found on Page 3-55.

4-27 **Page 3-10, Sect. 3.3.1**: Delete "Creek" from the name of "Clear Lake". Include Clear Lake in Table 3-1 and consider improved upstream fish passage for anadromous and/or resident fish species (e.g. bull trout) at the spillway channel.

4-28 **Pages 3-13 and 3-14**: Figures 2-1, 2-2 and 2-3 provide a good visual reference for the information provided in Tables 3-2 and 3-3. Cross-reference the tables and figures in the text.

4-29 **Pages 3-16 and 3-17:** Correct table references (Tables 2-2 and 3-2) on these two pages.

4-30 **Page 3-16, Section 3.3.3.7 - Cowiche Creek**: The towns of Tieton and Cowiche dump effluent into the North Fork Cowiche Creek. Rather than describing the stream as "naturally dry", intermittent might be a better term to use.

4-31 **Page 3-17, Section 3.3.4.2. - Swauk Creek**: The summer low flows of Swauk Creek are not as natural as described in the document. Historical mining activities changed the channel and floodplain on a basin-wide scale. The incised nature of the channel controls and limits floodplain access. Therefore, the base flows have been modified for over 150 years.

4-32 **Page 3-20, Section 3.3.4.11. - Toppenish Creek**: Irrigation practices have caused the stream to dry up rather than historical/natural functions.

4-33 **Page 3-30:** Update the reference to the Ahtanum subbasin adjudication exceptions hearing which was scheduled to occur last October.

4-34 **Page 3-38, Table 3-6**: Update the Teanaway River 303(d) references.

4-35 **Page 3-45, Sect. 3.9.1.1**: Include Clear Lake and the tributaries upstream of Clear Lake Dam (North Fork Tieton River and Clear Creek) in the "Extent of Affected Area" section. Include the upper North Fork Tieton, Clear Creek and Clear Lake in the discussion of tributary habitat above the Reclamation reservoirs, and distribution of resident fish and possibly reintroduction of anadromous fish through construction of passage facilities at the Reclamation storage dams. Also include discussion of the Columbia River.

4-36 **Section 3.9.1.2, Para. 1:** Resident bull trout are present above all **<u>six</u>** Reclamation storage dams, when Clear Lake Dam is included.

4-37 **Paragraph 2:** "Keechelus River" does not exist---Keechelus Dam is located at the outlet of ancestral Keechelus Lake, which is the origin of the Yakima River.

4-38 Clarify and expand the reference to the "additional upstream barrier" in the Cle Elum River. We believe you are referring to a natural feature (falls or cascade) on the upper Cle Elum River in the vicinity of the China Point area that may be a partial fish passage barrier at certain flows. If so, the USFS – Cle Elum Ranger District has information on this possible passage barrier from habitat surveys they have conducted.

4-39 Clarify the meaning for "constructed barriers" for Taneum, Big, Manastash and Naneum creeks. All the man-made structures in Taneum Creek and Big Creek have fish passage facilities (upstream and downstream). Rewrite these two paragraphs to correct errors and provide clarification on the location, type (man-made or natural) and extent (complete or partial) of barriers to fish passage.

4-40 In several locations throughout the document, Cowiche Creek is noted as not having physical fish passage barriers. The natural channel of Cowiche Creek has at least two physical "obstructions" or "obstacles". The use of the term "obstacle" indicates that fish migration may be impeded at certain flows, but the feature is not a complete barrier to migration. Fish will enter the stream from the Naches River via an irrigation ditch to avoid these obstructions.

4-41 **Page 3-46, Steelhead, Para. 2**: Any hatchery steelhead currently returning to Yakima Basin are strays from outside the basin. No hatchery steelhead have been produced and released in the Yakima Basin since the early1990's.

4-42 **Page 3-46, Fall Chinook**: Fall chinook, in general, inhabit the lower 100+ miles of the Yakima River. Some years, fall chinook have been documented spawning in the reach between Union Gap and Selah and in the lower Naches River downstream of the City of Naches. The Yakama Nation has been acclimating and releasing fall chinook into the Naches River at Gleed for several years. These releases upstream of Union Gap will soon be transitioned from fall to summer chinook salmon as the Yakama Nation and WDFW attempt to reintroduce extirpated summer chinook to the middle Yakima River and lower Naches River.

4-43 There is a typographic error in the number of fish in 1997 (para. 2, line 2).

4-44 **Page 3.9.1.4, Para 2**: Again, "Keechelus River" does not exist upstream of Keechelus Dam.

4-45 Rewrite this section to include "above-reservoir tributaries" of Clear Lake Dam and change the count of Reclamation storage dams from five to <u>six</u> throughout the SDEIS.

4-46 **Page 3-47, Flow Conditions, Para. 1**: Gold Creek flows directly into Keechelus Lake. See comments for section 3.9.1.2, para. 2 for an explanation. Historically Gold Creek flowed into ancestral (smaller) Keechelus Lake prior to construction of Keechelus Dam.

4-47 **Page 3-48/49, LWD Conditions**: LWD is also lacking in lower reaches of the basin due to passive removal of LWD captured in the Reclamation storage reservoirs. Much of the floating LWD washes up on the shores of the reservoirs or becomes waterlogged and sinks to the bottom. The reservoirs, to varying degrees, are sediment and LWD "traps".

4-48 **Page 3-49, Channel Conditions**: WDFW disagrees with the statement that…"the Bumping and Tieton rivers generally exhibit habitat conditions due to basically unaltered channels". This statement only applies to the reaches upstream of the Reclamation storage dams. Downstream, the Tieton River, and to a lesser extent the Bumping River, are essentially high gradient, high velocity irrigation flow "conduits" for releases from Bumping and Tieton dams. The Tieton River channel complexity is very low with few if any side channels, braids or meanders. High flow releases have scoured spawning gravels in the Tieton River resulting in increased substrate particle size (cobbles and boulders not suitable for spawning).

4-49 Delete the sentence on the degradation of the Keechelus River (Para. 2). See section 3.9.1.2.

4-50 Only <u>portions</u> of the Teanaway River, Manastash Creek and Cowiche Creek have "excellent riparian corridors and cover"…particularly in the upper portions of these subbasins above the agriculture zone. Reaches within forestlands (either public or private) generally have higher quality riparian zones, channel complexity and LWD density.

4-51 **Page 3-50, Para. 2**: The statement that…"low flows and sedimentation preclude fish passage" is inaccurate. Low flows can inhibit or even preclude fish passage at times, but sedimentation is never an impediment to fish passage. Sedimentation can impact spawning success (imbedded gravel) and egg/embryo survival, but not fish passage.

4-52 **Para. 3:** Rewrite the first sentence of this paragraph. There are two points in the sentence that are misleading. First, most diversions in the mentioned streams are screened or will soon be screened. The irrigation diversions on Big Creek and Toppenish Creek are all (or nearly all) screened. Only one or two unscreened diversions exist on Cowiche Creek and they are scheduled for screening soon. Second, these diversions are small relative to existing and downstream flows. In this area fish passage conditions related to the actual diversion, as is the case with perched culverts, are a concern rather than flow conditions.

4-53 **Sect. 3.9.2.2, Para 1:** The scientific name for **westslope** cutthroat trout, a cutthroat subspecies, is *O. clarki lewisi.* Westslope cutthroat are native to the Yakima Basin, while the other two subspecies found in WA, coastal cutthroat *O. clarki clarki,* and Lahontan cutthroat *O. clarki henshawi*, are not found in this basin. Using *O. clarki* is appropriate only if you reference cutthroat trout generically, without the subspecies descriptor.

4-54 **Page 3-51, Paragraphs 3 and 4**: Rewrite the bull trout section with updated references. The presence of a viable population of adfluvial bull trout in Cle Elum Reservoir is doubtful because of the long-standing presence of exotic lake trout, which out-compete and hybridize with pure-strain bull trout. Resident bull trout are found in the upper Ahtanum basin (North, South and Middle Forks of the Ahtanum Creek) and not generally in the lower mainstem where water

4-54 temperatures are too high. On occasion, bull trout have been observed in the mainstem Ahtanum in the winter or early spring when flows are high and cold. Adfluvial bull trout enter reservoir tributaries (not mainstem rivers) in summer to hold and eventually spawn. The lack of upstream/downstream fish passage facilities at the Reclamation storage dams prevents adfluvial fish from interbreeding with downstream fluvial populations. This lack of gene flow between small, fragmented bull trout populations is part of the rationale for constructing fish passage facilities. Fluvial bull trout migrate out of the mainstem Naches and Yakima rivers into spawning tributaries in the late summer and spawn in September-early October.

4-55 Where is "Naches Lake"? Is this actually a reference to the Naches River fluvial population? If so, we have good information (including SaSI designations) on the status of the three spawning populations that comprise the Naches fluvial group (Rattlesnake Creek- depressed, American River - depressed, and Crow Creek - critical).

4-56 **Page 3-52, Sect. 3.10 Recreational Resources**: The Naches River <u>does</u> provide high quality trout fishing opportunities for wild westslope cutthroat, rainbow trout and mountain whitefish. The best river fishing in the Yakima Basin for large cutthroat occurs in the upper Naches River above the confluence with the Tieton River. It is true that drift-boat fishing access is limited, compared to the upper Yakima River above Roza Dam. However, the public has access to substantial sections of the river for wading and bank fishing from the Hwy. 410 right-of-way, as do inflatable watercraft, such as pontoon boats and cata-rafts.

The Tieton River below Tieton Dam <u>does not</u> provide a high quality trout fishery, despite excellent public access from Hwy. 12, because of the poor quality habitat and low channel complexity described above under "Channel Conditions". River and creek fishing in the Yakima Basin is dependent on the reproduction and growth of wild trout populations. Hatchery-reared trout are no longer stocked into rivers and streams---only ponds and lakes. Hence, good stream fisheries depend on providing large amounts of high quality habitat and flow. The highly altered and regulated lower Tieton River is no longer capable of supporting a quality wild trout fishery at
4-57 this time. A beneficial fisheries outcome from Alt. 2 – Integrated Water Resource Mgmt., would be to restore flow, spawning and rearing habitat, and channel condition (complexity, LWD, etc.) to the level that would support increased wild trout production and provide a quality fishery.

4-58 **Page 5-4, Sect. 5.3.2.1**: It may be unreasonable to assume that in the future under the IWRM alternative "the Yakima Project reservoirs will be operated the same as they are currently". New fish passage designs will require change in reservoir operation and impacts to surface water should include potential changes. For example, when downstream fish passage facilities are constructed at the storage dams, the reservoirs may be operated to fill earlier in the spring to permit passage of salmon and steelhead smolts earlier and for a longer duration. Such an operational change at the reservoir may not significantly change the downstream flow regime---just the pathway for reservoir releases to promote fish passage, but should be included in the SDEIS.

4-59 **Page 5-12, Sect. 5.3.2.3. – Large Bumping Expansion – Water Available for Storage:** WDFW believes that the amount of water estimated to be available for storage should be recalculated. Subtracting a minimum fish flow release (either 130 cfs or 600 cfs) from Bumping

4-59 Reservoir inflow only yields an estimate of "gross storable volume". Timing of the annual runoff is critical to determining "net storable volume". Figure 5-1 and Appendix Table D-1 show that a significant portion of the water that currently cannot be stored at Bumping Lake is passed through the reservoir in the April-June period. 130 cfs in the Bumping River will not provide sufficient flows to Naches River and lower Yakima River for the smolt passage during the critical April – June migration period. Hence, the decision to make a storable volume calculation based on a higher Bumping River flow of 600 cfs (or unregulated flow, whichever is less) is more reasonable. In addition, recalculate the time frame based on a three-month, April 1 – June 30 period to cover the migration of all species (spring, summer and fall chinook, coho, steelhead and sockeye). This would reduce the 69,500 ac-ft. estimate of storable flow and provide a conservative estimate.

4-60 Also address April – June irrigation demands. We suspect that a significant portion of the unregulated Bumping River flow in April – June is currently used to meet irrigation demands upstream of the Yakima River at Parker gage control point. If this "natural flow" is being beneficially used to meet early season irrigation demand (and to preclude premature releases from the other reservoirs that are refilling), then it cannot be stored in an expanded Bumping Reservoir. April – June irrigation demands would further reduce the estimated storage volume. Bumping Reservoir inflows during the late fall/winter period (November thru March 31) above a Bumping River minimum flow (e.g. 130 cfs) can all be stored, but after April 1, the storable volume decreases significantly because of the increased smolt migration flow and irrigation demands. Fall/winter floods (e.g. Chinook wind, "rain-on-snow" events like the one that recently occurred) before the irrigation season and the onset of smolt migration provide the best opportunity to capture significant amounts of runoff in an enlarged Bumping Reservoir---flow which is currently lost to the system and is unavailable for later use for fish or irrigation.

4-61 Label the y-axis on Figures 5-1, 5-2 and 5-3 as "Cumulative Inflow Volume".

4-62 The reservoir management scenario outlined in the SDEIS is a significant improvement over what Reclamation proposed in their 2006 Appraisal Report and is acceptable to WDFW from a conceptual perspective. Final WDFW policy approval for expanding Bumping Reservoir is contingent, among other things, on the provisions of a binding contractual agreement that would be developed by the "adaptive management team" parties to flesh out the details of reservoir management. For example, one item that needs to be decided is how the actual net storable volume in any given year is allocated between the irrigation and fish enhancement "buckets". Presumably this would be done on a prorated basis (e.g., 23.6% for irrigation drought storage; 76.4% for fish flow enhancement) until the full 100 KAF of irrigation drought water is stored for carryover. At that point, all additional storable water above the 100 KAF would be available for fish enhancement until the proratable irrigation districts call for their water during a drought year and their "bucket" needs to be replenished.

4-63 **Page 5-26, Wymer Operation:** Clarify what you mean in the last sentence of paragraph 1…"The remaining volume would be obtained by skimming flows…". We assume you are referring to the 80 KAF that would be diverted into Wymer Reservoir and carried over for the proratable irrigation districts to use in drought years to assure they receive 70% of entitlement.

4-63 Once stored, this water would not have to be diverted again until it is used during a drought year and the "bucket" needs to be replenished.

4-64 **Page 5-28, Wymer Pipeline Option:** From an operational perspective, the pipeline option for filling Wymer Reservoir is superior to the two KRD canal options because of the high value of year-round operation for storage and/or flow routing around the upper Yakima River. WDFW will be very interested to see the estimated annualized cost per acre-foot of water delivered to Wymer Reservoir for the three gravity alternatives and Reclamation's pumping alternative (i.e., capital construction and annual O&M costs spread over a 100-year period).

4-65 It also appears that the Integrated Water Resource Management alternative is looking at Bumping Lake Enlargement and Wymer Reservoir construction as an **"either/or"** decision. WDFW thinks it would be valuable to look at the benefits (i.e., dispersed new storage, additional operational flexibility on both major arms of the basin), environmental impacts and costs of constructing the <u>two smaller reservoirs</u>---Wymer (162.5 KAF) <u>and</u> the Bumping "Small Option" (200 KAF).

4-66 **Page 5-43, Sec. 5.6.2.3., Para. 1 - New Storage Element**: The water temperature stratification studies in Bumping Lake do not support the idea of increased downstream temperature impacts. Temperatures of 16^{o} C. or cooler will not harm salmonids.

4-67 **Page 5-50, Sec. 5.8.3 —Impacts of Integrated Elements:** "Operational and structural changes to existing facilities are <u>not anticipated to result in impacts because construction associated with these elements would occur in previously disturbed areas</u> or built environments." WDFW maintains that the magnitude of the impact to wildlife is related to the degree of disturbance of lost areas. Disturbed areas still provide habitat for wildlife, therefore loss of disturbed areas will create an impact to wildlife. It is the magnitude of the impact that is variable.

4-68 **Pages 5-50 & 51, Sec. 5.8.4 – Vegetation and Wildlife Mitigation Measures:** The SDEIS states that additional site specific studies and impact analysis will be completed for individual projects, but estimates of impacts to vegetation and wildlife should be provided for identified projects. The most significant impacts to wildlife habitat would probably occur due to inundation at Bumping Lake and the proposed Wymer reservoir. The SDEIS provides an estimate of 2,820 acres of habitat that would be inundated by the 458 KAF Bumping option, but similar estimates should also be provided for the 200 KAF Bumping and Wymer reservoirs.

4-69 In addition to the described mitigation, habitat evaluation should include current and future conditions with and without actions. Habitat that is lost should be mitigated for through replacement of existing habitat of the same or better condition at ratio of 2 acres of mitigation habitat to 1 acre lost to inundation or construction of other facilities.

4-70 Impacts from lateral piping projects (KRD, etc.) were considered in Section 5.3 - Surface Water, which indicated that piping would save surface water lost to conveyance and operation (a positive impact). However, this same activity was not addressed in Section 5.8 - Vegetation and Wildlife, where piping laterals can be considered a negative impact. Water lost from canal leakage may create temporary ponds and wetlands. This type of habitat is important to

4-70 amphibians, birds and other wildlife. Address impacts to wildlife from the potential loss of wetland or riparian habitat caused by piping laterals and other surface water conservation elements.

4-71 **Page 5-51, Sect. 5.9.2.1, Fish Passage Element:** Add Clear Lake Dam to the list of sites where fish passage improvements should be constructed. Only upstream passage improvements are needed at Clear Lake (downstream passage is provided by year-round surface spill from Clear Lake and/or dam outlet releases). Work at the spillway channel, aimed at improving passage for ESA-listed adult bull trout migrating from Rimrock Reservoir to spawn in the upper North Fork Tieton River, may be as simple as modifying the bedrock channel by drilling and/or blasting in one or two critical locations without the need for conventional fish ladder construction. It is believed that bull trout are presently negotiating the spillway channel under certain flow conditions, based on observation of adfluvial-size fish on the spawning grounds in 2007 and 2008, but there is an opportunity for improvement to allow easier passage. Monitoring (e.g. radio-telemetry tagging) to definitively determine the origin of upper North Fork Tieton spawners should be conducted first before initiating passage improvements at the spillway channel. If warranted, this relatively low cost work should be a high priority and could occur before high cost upstream and downstream passage facilities are constructed at Cle Elum and Bumping dams.

4-72 Update **Table 5-17** to indicate medium or high benefit to bull trout from near-term passage improvements at Clear Lake Dam. When upstream/downstream passage is ultimately restored at Tieton Dam, spring chinook, steelhead and coho would also benefit from upstream passage improvements at Clear Lake.

4-73 **Page 5-57, Paragraph 2:** Reclamation fish biologists have developed quantitative estimates of sockeye and coho production potential upstream of Cle Elum and Bumping dams to support Reclamation's fish facility construction planning report and the co-manager's anadromous fish reintroduction plan. Cite the four final technical reports authored in 2007 by Stephen Grawbowski in Chapter 6 (References).

4-74 **Page 5-67, Para. 4:** Yearling coho salmon smolt migration actually coincides with yearling spring chinook and steelhead smolt migration (age 1, 2 or even 3 year-old smolts) in April – May. Coho smolt migration does not peak in fall/winter as indicated here. In the future when reintroduced, sockeye smolts will also migrate as yearlings during this April - May period. Therefore, four species of salmon would benefit from power subordination at Roza and Chandler during these two months. Age 0 summer and fall chinook smolt migration peaks in early-mid June and would benefit from extending power subordination until June 30. SOAC monitors spring smolt migration from March 25 – June 30 annually and may recommend that Reclamation make pulse flow releases during this time period to aid migration downstream of Parker Dam---particularly in drought years. Evaluation of the power subordination should match SOAC's spring smolt monitoring period.

4-75 **Paragraph 6:** Flow improvements in the 7.4 mile Wapatox bypass reach will also benefit summer chinook salmon that are expected to utilize this reach for spawning and rearing once they are reintroduced. Brood year 2008 summer chinook from Wells Hatchery are currently

4-75 being incubated at the YKFP Chandler Hatchery. Acclimation/release of the 250,000 hatchery-reared summer chinook will occur in the lower Naches River in 2009 (age 0's) and/or 2010 (age 1's).

4-76 **Page 5-73, Para. 3:** A decrease in spring flows as a result of storing water in an expanded Bumping Lake reservoir would also reduce smolt migration flows and potentially affect survival---particularly in the lower Yakima River downstream of Parker Dam.

4-77 **Para. 4:** The qualitative assessment of the negative impacts to bull trout spawning/rearing habitat in the inundation zone of an expanded Bumping Lake is correct, but would be improved by comparing the amount of habitat inundated by the 200 KAF vs. 458 KAF options. WDFW will require additional comparative information between the "small" and "large" Bumping Lake options to assess both fish and terrestrial wildlife impacts. DOE is correct in stating that the currently isolated Deep Creek bull trout population would benefit from fish passage facilities at the new Bumping Lake Dam that would reconnect the adfluvial population to Naches Basin fluvial populations and allow for gene flow.

4-78 As stated in the SDEIS, fish passage at the Bumping Lake Dam dam restores bull trout access to previously utilized habitat that was blocked by Reclamation in 1910 when the existing dam was constructed. Therefore fish passage at the dam "would open up historical habitat". WDFW is very interested in the possibility of opening up new habitat (unused prior to 1910 dam construction) for use by bull trout, other resident salmonid species (cutthroat, rainbow trout and kokanee) and four anadromous species (spring chinook, coho, steelhead and sockeye). Specifically, WDFW is referring to providing upstream fish passage at the upper Bumping River natural waterfalls located above the lake at R.M. 22. This would open up 7+ miles of new spawning and rearing habitat extending to Fish Lake near the Cascade Crest Trail. The falls is within the area reserved for expansion of Bumping Lake and outside of the William O. Douglas Wilderness Area boundary. However, most of the upper Bumping River habitat is protected in the roadless wilderness area. Providing fish passage at the falls would complement the Bumping Dam passage facilities and synergistically increase fish production benefits. Higher levels of "marine-derived nutrients" could be expected by increasing anadromous fish utilization in the upper basin. This would benefit the entire Bumping River Basin ecosystem productivity, including all terrestrial wildlife (mammals, birds, amphibians, etc.). It would also provide real mitigation for inundation of salmonid spawning/rearing habitat in lower Deep Creek (currently used by listed bull trout) and other tributaries to Bumping Lake and the Bumping River above the new dam site (i.e., Cedar Cr., Boulder Cr., Barton Cr., Granite Cr., etc.) used by cutthroat trout, rainbow trout and/or kokanee.

4-79 **Page 5-80, Para. 4:** In referring to the YKFP, change "Fish Program" to "Fisheries Project".

4-80 **Table 5-22**, **lower Yakima River from Prosser to the mouth:** Modify Table 5-22 to include benefits to coho and steelhead. An increase in production throughout the basin would move fish downstream into suitable habitat that is presently not fully utilized. There would be year-round benefits to the lower river reaches depending on the magnitude of the flow and habitat increases.

4-81 **Page 5-87, Mitigation Measures:** See the above discussion regarding providing fish passage at Bumping River falls to mitigate for unavoidable long-term impacts to fish from expanding Bumping Lake. Additional mitigation for terrestrial wildlife impacts in the reservoir inundation zone will be required. See comments for Pages 5-50 & 51, Sec. 5.8.4 – Vegetation and Wildlife Mitigation Measures.

4-82 **Page 5-88, Sect. 5.10.2.3, New Storage Element Impacts to Recreation:** Replacement/improvement of facilities, such as USFS campgrounds and boat-launching facilities eliminated or degraded by project components should be part of the integrated program and should be constructed <u>concurrently</u> with other primary elements. The project proponents should plan on incorporating recreational facility mitigation elements into the Integrated Water Resources Management Alternative to prevent a "piece-meal" approach to funding which could result in long delays in mitigating unavoidable, long-term recreational impacts. Managers, WDFW included, and users of the recreation facilities and associated natural resources will expect mitigation to be implemented sooner than "many years…after completion of the Bumping Lake expansion project".

4-83 **Page 5-88, Last Paragraph:** Existing river operations result in low flows in the **Tieton River** (not upper Yakima River.) during most of the irrigation season.

4-84 **Page 5-101, Sec. 5.13.2.4 - Value of Goods and Services**: Give examples of other goods and services where a monetary value cannot be established that might be provided by habitat enhancements. For example, ecosystem functions play an important role in maintaining water quality. Connecting floodplains and establishing riparian vegetation will naturally filter water potentially reducing municipal water treatment costs.

4-85 **Section 5.3 - Socioeconomics** acknowledges "…the benefits of better health for ecosystem resources owned by all citizens." Elaborate on how a healthy ecosystem improves the quality of life for citizens. A healthy ecosystem is a "win-win" for the natural resources and the citizens of Washington and can provide socioeconomic benefits.

4-86 **Table C-2, Reecer Creek:** The alluvial fan reach of Reecer Creek also drys up in the winter from agricultural uses. This should be noted as a barrier to upstream winter movement by parr and sub-adults.

Thank you for the opportunity to provide detailed general and specific comments on the SDEIS. WDFW is prepared to assist DOE in finalizing the EIS and working together to help assure that the preferred alternative is advanced to secure future implementation funding.

Sincerely,

Jeff Tayer

Jeff Tayer, Regional Director

Comment Letter No. 4 – Washington Department of Fish and Wildlife – Jeff Tayer

4-1	Comment noted.
4-2	Comment noted. As noted in your comment, the level of detail requested is not feasible to provide in this programmatic EIS. However additional modeling of the alternatives has been completed and is summarized in the Final EIS. That summary includes flow hydrographs at key locations in the basin.
4-3	As stated in Sections 1.2.1.1 and 1.2.1.2 of the December 2008 Final Planning Report/EIS, the study was authorized by both federal authority and state authority to include municipal water supply as a goal.
4-4	Generally streams intersecting the KRD North Branch Canal experience the return flow issues described in your comment. Return flow management for those streams is not part of the alternative at this time, but could be added if infrastructure to deliver water to Wymer reservoir along the path of the North Branch Canal is constructed.
4-5	Comment noted. This could be considered when a proposed storage project is carried forward to additional environmental review.
4-6	The dates have been corrected on the revised Fact Sheet in the Final EIS.
4-7	The list of threatened and endangered species has been corrected throughout the text of the Final EIS.
4-8	The Final EIS text has been revised to state: "For many projects, the majority of costs would be borne by taxpayers, and benefits would be realized by those who experience an increase in goods or services: irrigators who would realize the benefits of an increase in the reliability of water supplies; anglers who would realize the benefits of improved fishing opportunities; or citizens who would realize the benefits from healthier, more robust ecosystems, for example."
4-9	The corrections have been made to the Final EIS.
4-10	This Final EIS contains a more detailed evaluation than the December 2008 Supplemental Draft EIS, but is still a programmatic evaluation. The text has been revised to clarify the names of the various NEPA and SEPA documents.
4-11	Text was added to the Final EIS to clarify.
4-12	The text has been revised and updated in the Final EIS.
4-13	The correction has been made to the text in the Final EIS.
4-14	The information you provided has been added to Section 2.3.2 in the Final EIS.
4-15	The text of the Final EIS has been changed to clarify the reference to the September 2008 Cle Elum Lake and Bumping Lake Fish Passage Facilities Planning Report.
4-16	The correction has been made to the Final EIS per your suggestion.
4-17	The text in the Final EIS has been corrected per your suggestion.
4-18	The recommendation to improve fish passage at Clear Lake Dam has been added to the Final EIS per your suggestion.
4-19	The information regarding additional fish species has been added to the text of the Final EIS.
4-20	Kokanee was added to the list of species in Kachess Lake in the Final EIS.
4-21	The text has been changed in the Final EIS per your suggestion.
4-22	A comparison between Reclamation's proposed operations and the Integrated Water Resource Management Alternative's proposed operations was added to Section 2.3.4.1 of the Final EIS.

4-23	Figure 2-4 has been revised in the Final EIS to show the outline of the smaller Bumping Lake option.
4-24	A statement has been added to the Final EIS regarding the impacts of the modification of operations on the Bumping River and Naches River flow regime.
4-25	Comment noted. Additional flow and fish habitat options will be considered in the next stage of studies and could include projects in the Wenas Creek basin.
4-26	The text has been corrected in the Final EIS.
4-27	The change was made to the text of the Final EIS per your suggestion.
4-28	Cross references to the figures have been added to the text of the Final EIS.
4-29	The table references have been corrected in the text of the Final EIS.
4-30	The suggested changes were made to the Final EIS text.
4-31	The suggested changes were made to the Final EIS text.
4-32	The suggested changes were made to the Final EIS text.
4-33	The reference has been updated in the Final EIS per your suggestion.
4-34	Ecology submitted the candidate 303(d) list to the EPA on June 23, 2008. According to the Simple Query Tool, provided on Ecology's website (http://apps.ecy.wa.gov/wats08/), there were five parameter designations for the Teanaway River which address instream flow, turbidity, and three for temperature. However, all five of the proposed designations for the Teanaway River are Category 4A or 4C. Only Category 5 designations are included on the 303(d) list. Therefore, these designations will be included in the 305(b) state-wide assessment report, but not on the 303(d) list of impaired waters of the state. As a result, we have not revised the referenced 303(d) table (Table 3-6).
4-35	The tributaries you noted were added to the Extent of Affected Area in the Final EIS (Section 3.9.1.1). The Columbia River was described in the January 2008 Draft Planning Report/EIS and in Reclamation's December 2008 Final Planning Report/EIS; therefore, no additional information on the river was added to the Final EIS.
4-36	The text of the Final EIS was edited to clarify that bull trout are present above all Reclamation storage dams.
4-37	The correction has been made to the Final EIS.
4-38	Section 3.9.1.2 of the Final EIS has been revised to clarify fish passage conditions.
4-39	The discussion of constructed barriers was clarified in the Final EIS per your suggestion. Appendix C, Tables C-1 and C-6 contain further fish barrier information.
4-40	Section 3.9.1.2 of the Final EIS has been revised to clarify fish passage conditions.
4-41	The information on steelhead has been corrected in the Final EIS.
4-42	The information on fall Chinook has been corrected in the Final EIS.
4-43	The error has been corrected in the Final EIS.
4-44	The correction has been made in the Final EIS.
4-45	Information on Clear Lake Dam has been added to the Final EIS. However, Reclamation considers that it has five major reservoirs in the Yakima basin as described in Section 3.3 of this EIS, so the number of reservoirs was not changed.
4-46	The correction has been made in the Final EIS.
4-47	The section on large woody debris has been revised in the Final EIS per your suggestions.
4-48	The Channel Conditions section has been revised in the Final EIS to reflect your information.
4-49	The Channel Conditions section has been revised in the Final EIS to reflect your information.

4-50	The Channel Conditions section has been revised in the Final EIS to reflect your information.
4-51	The sentence has been clarified in the Final EIS per your suggestions.
4-52	The sentence has been rewritten in the Final EIS per your suggestions.
4-53	The scientific name has been corrected in the Final EIS.
4-54	The discussion of bull trout has been revised in the Final EIS per your suggestions.
4-55	The error has been corrected in the Final EIS.
4-56	The recreational resources descriptions for the Naches and Tieton Rivers have been altered in the Final EIS to reflect your information.
4-57	Your comment regarding the benefits of the Integrated Water Resource Management Alternative is noted.
4-58	Comment noted. It is possible that minor operational changes would be required when fish passage facilities are installed; however, it is not expected that water allocation would be altered. Any changes in reservoir operations would be evaluated in project level environmental evaluations that will be conducted when specific fish passage projects are brought forward.
4-59	The estimates have been revised based on new RiverWare model results.
4-60	See the response to your Comment 4-59.
4-61	All of the figures in Chapter 5 have been revised with new modeling results.
4-62	Comment noted. As described in Section 5.3.2.1, the actual allocation of water would be dependent on flow and water supply conditions and would be determined by a management team consisting of representatives from Reclamation, the Yakama Nation, major irrigators, and fish agencies.
4-63	Your assumption is correct and the text of the Final EIS has been revised for clarification.
4-64	Comment noted.
4-65	Comment noted. Hydrologic modeling was performed for the combination of Wymer and Bumping reservoirs, although only the large Bumping option was included in the model because of time limitations. Additional modeling of the small Bumping option may be warranted in future phases of this project.
4-66	Section 5.6.2.3 addresses water quality only, not impacts to fish which are addressed in Section 5.9. Expanding Bumping Lake would increase the amount of thermal heating of the lake; however, enlarging the lake would decrease the ratio of surface area to volume which would likely result in somewhat lower average temperatures. Water temperatures downstream of the reservoir would depend on the elevations from which releases are made. Whether this would cause a detrimental impact to salmonids would depend on the magnitude and direction of change in water temperature and quality. This would be determined during design of the expanded reservoir.
4-67	Comment noted.

4-68	For the Wymer reservoir, Section 4.7.2.4 of the January 2008 Draft Planning Report/EIS includes estimates of inundated area by habitat type (1,055 acres shrub-steppe habitat; 167 acres grassland; 62 acres barren land; 50 acres riparian area; 30 acres cliff/canyon; 11 acres agricultural cropland; 7 acres developed land; 6 acres forest habitat; 4 acres wetland). Area estimates for the 200,000 acre-foot Bumping reservoir option have not been developed in existing documents which were used as the basis of the analysis in this document. Acreage estimates would be part of the further studies that would be required if this option is pursued. Please refer to Section 1.7 which describes the additional studies that would be required for elements of the Integrated Water Resource Management Alternative.
4-69	Comment noted. Specific habitat mitigation measures would be explored and developed in cooperation with WDFW if this storage option is pursued.
4-70	Statements were added to Section 4.8.2.2 and Section 5.8.2.2 of the Final EIS about the negative impact to wildlife from the loss of wetland or riparian habitat caused by piping laterals.
4-71	A statement was added to the text in the Final EIS that fish passage improvements would be considered at Clear Lake Dam as part of the Rimrock Dam passage improvements. At this time there are no specific proposals for Clear Lake Dam; however, passage could be considered when passage improvements at Rimrock Dam are brought forward.
4-72	The table was not revised to specifically include passage at Clear Lake Dam because there are no specific proposals at this time to provide passage at Clear Lake Dam as noted in the response to your Comment 4-71.
4-73	Information was added to the text in the Final EIS using the sources you recommended.
4-74	Information was added to the Final EIS per your suggestions. The text was revised to include the potential for subordinating power through June 30.
4-75	Information about summer Chinook reintroduction was added to the paragraph in the Final EIS.
4-76	A statement was added in the Final EIS about the impact on smolt migration.
4-77	Additional analyses of the small Bumping Lake expansion option would be performed in future phases of this project if that option appears to be the most feasible option for storage in the Naches River basin.
4-78	Your comments regarding expansion of fish habitat above Bumping are noted. At this time, there are no proposals to open up new habitat by removing natural barriers. This could be considered in the future.
4-79	The correction was made to the text in the Final EIS.
4-80	Table 5-22 was changed in the Final EIS per your recommendation.
4-81	Comment noted. See the response to your Comment 4-78.
4-82	Text has been added to the mitigation section in the Final EIS to include appropriate timing.
4-83	The text states there are low flows in the upper Yakima River *basin*. Text has been added to the Final EIS to specify the Tieton River.
4-84	New text has been added in the Final EIS to provide examples of other goods and services for which a monetary value cannot be assigned.
4-85	Text has been added in the Final EIS to expand the discussion of the benefits of healthy ecosystems.
4-86	Table C-2 in the Final EIS was modified per your suggestion.

Comment Letter No. 5

YAKIMA REGIONAL CLEAN AIR AGENCY

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December 17, 2008

Mr. Derek I. Sandison
Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902-3452

RE: Supplemental Draft Environmental Impact Statement (EIS) – Yakima River Basin Water Storage Feasibility Study

Dear Mr. Sandison:

Thank you for providing the Yakima Regional Clean Air Agency (YRCAA) the opportunity to review and comment on the Supplemental Draft EIS.

Following review YRCAA has the following comment(s):

5-1

1. The Chronic PM_{10} impact (see in 5.15.2.3) upon Yakima County must be addressed; and
2. An alternative to reduce emissions must be identified. Yakima County is under a PM_{10} maintenance plan and is threatened to be in non-attainment for $PM_{2.5}$.

Thank you for the opportunity to connect with the city's continued support-in-protecting the air quality in Yakima County.

Best regards,

Hasan M. Tahat, Ph.D.
Engineering and Planning Division Supervisor

Cc: File

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DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Comment Letter No. 5 – Yakima Regional Clean Air Agency – Hasan M. Tahat

5-1	Your comment is acknowledged. Additional analysis of air quality impacts would be conducted when any proposed new storage project undergoes project-level SEPA and/or NEPA evaluation. Appropriate air quality mitigation measures would be identified at that time.

BOARD OF YAKIMA COUNTY COMMISSIONERS

★ District One
Michael D. Leita

★ District Two
Kevin J. Bouchey

★ District Three
Rand Elliott

January 16, 2009

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JAN 16 2009
DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Derek I. Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima WA 98902-3452

Re: **Supplemental Environmental Impact Statement on "Yakima River Basin Storage Feasibility Study"**

Dear Sir:

6-1 We support and commend Ecology for the initiation and rapid completion of the draft for the Supplemental Environmental Impact Statement "Yakima River Basin Water Storage Feasibility Study". We considered that Ecology's process and document could address missing elements in the Bureau's Yakima River Basin Storage Study Feasibility Study and EIS. Compared to the Bureau's study, an integrated approach to watershed issues that was not severely limited and better incorporated habitat issues and supply options, was needed. We see the Bureau's process for development of the PR/EIS as flawed, not supported by the basin at large, and a Record of Decision based on that process constraining or preventing future efforts to improve water supply or habitat.

We plan on strongly objecting, or appealing, the Final PR/EIS and are concerned about the restraints from the Record of Decision upon the SEIS development and any future actions coming out of Ecology's SEIS. We are concerned that the No Action alternative will lead to a modified YRWEP where actions will be taken with limited consultation and the funds will be extremely limited, particularly for significant storage or water supply projects due to the ROD.

We participate in several of the basin boards to provide support for habitat and water supply needs. We were considered during the start up of Ecology's process and staff attended the meetings, as invited. We consider it important to have representation of the Counties in the basin so that the interest of the citizens and economy at large are represented. We have reviewed your draft and attaching specific comments from staff in addition to those below.

6-2 The SEIS provides an improved look at potential alterations of existing infrastructure to meet integrated resource needs, particularly habitat issues and the needs of specific holders of junior rights. On review we consider that it does not address the overall water needs for Yakima County citizens or other Counties in the basin. Specifically, the need for a fuller economic and socioeconomic evaluation is required and was not developed, nor guidelines set. This is especially true given that this basin is dependent on irrigated agriculture, is over allocated for surface water and borrowing since 1977 from our limited and finite groundwater resource,

6-2 and all indications in both studies are that we will be faced with reduced manageable supplies due to climate change and increased basin demands due to growth. In combination all these elements increase the risk to the basins economy, fish and wildlife and they were not adequately treated in the draft SEIS. We had hoped that Ecology would make comprehensive connections on supply and demand since it is more suited to such analyses, including future conditions, due to its authority and responsibilities for surface and groundwater provided by State law. Therefore we find repeated references to the economic analyses within the January 2008 PR/EIS troubling and not supportable if our goals and Ecology's goals are to be met.

6-3 One of our requests was that a criteria and process for evaluating needs and priorities be proposed as part of the SEIS, even if completion of such was not possible during the SEIS process or time frame. That would have enabled a wider view of the Storage Study goals and objectives that could produce a collaborative decision representing basin needs. We have seen numerous initiatives that have failed due to lack of consolidated leadership and we consider that this leadership issue needed to be addressed now. We do not see this concern in your document and agree with the comments from Benton County Commissioners in this regard in lacking "big picture' and direction. One example is that we cannot support the decisions within Section 2.4 to reject alternatives given their cursory treatment and the lack of criteria for the decisions. Specifically, we recommend the retaining of Columbia River transfer, small storage reservoirs and modifications to management of reservoirs to reduce flip-flop. 6-4 Ecology's reason for removal of flip-flop is particularly troubling as all the parties necessary to evaluate the continuing need for flip flop participated in the development of this SEIS, yet Ecology, on its own, did not bring it forward.

6-5 The SEIS gives the impression that we would be able to do obtain all of these habitat benefits IF we had the necessary water, yet it does not address how to get the water, or how to overcome or replace the Bureau's cost benefit analysis. We also agree with Benton County that "the water resource managers need to "get real' with the affected public, and layout a credible action plan for how this type of approach would be accomplished "and provide a fuller analysis of storage versus demand. We suggest the SEIS take a more reasonable and foreseeable risk based approach as opposed to benefit based that better incorporates the future we will face.

Sincerely,

Board of Yakima County Commissioners

J. Rand Elliott, Chairman

Michael D. Leita, Commissioner

Kevin J. Bouchey, Commissioner

Enclosure

Technical Comments on the SEIS, Yakima River Basin Water Storage Feasibility Study

Yakima County Public Services
January 16, 2009

General Comments:

6-6 The document contains no mention of flooding, flood control by BOR, floodplain restoration relative to flooding hazard, floodplain restoration relative to water conservation (increased Surficial aquifer storage). These issues relate directly to management of the Yakima Project reservoirs for flood control which to some degree increases the risk of not maximizing the storage potential of the reservoirs for irrigation and other uses. This conflict/risk will likely increase in the future due to climate change, which will likely cause a decrease in precipitation which falls as snow (i.e decreased natural storage), increasing the relative importance of the reservoirs in the annual water budget. Planning for these changes in the annual hydrograph should begin sooner rather than later and in the context of both flood risk and water supply risk in the future.

6-7 A major project that is not included in the SEIS is the SF Tieton bridge replacement. This action will improve bull trout access and provide significant flexibility in management of Rimrock Lake, with the potential to reduce effects of flip flop or additional summer water supply in drought years.

6-8 **Page 1-6 and 2-1 Ecology's Objectives** – Ecology's stated objectives are "To provide water for irrigated agriculture and municipal water needs and to improve habitat for anadromous and resident fish." These objectives need to have at least some minimal criteria associated with them, otherwise the EIS is crippled because there are seemingly no rational or objective reasons for retaining certain alternatives and eliminating others. The one strength of the previous PR/EIS was the goals for water supply that the BOR included, this SEIS does not state any goals or specific policy objectives, and therefore the reader and policy makers are mystified by the process used to develop the "package" and how it could will be evaluated for effectivenss for water supply or fish and wildlife. We suggest that the alternative and action development process should have included additional elements, with criteria based on both risk and benefits, to those that are put forth in the SEIS on page 2-1. These elements should include:

6-9 **Leadership/Proponents** – Is there an identified advocate or proponent for this action, can that proponent carry this action forward? Or is this action proposed by parties who cannot carry it forward themselves and requires cooperation or political/legal solutions?

Socioeconomics – Does this project make sense socially and economically? The criteria associated with this element should not be reiterated from the January PR/EIS due to the flaws in that analysis.

Water Dependability – The PR/EIS had the 70% pro-ratable goal, individual actions and the package as a whole should be measured against some stated criteria.

Groundwater – What is the future of groundwater availability both in terms of expansion of groundwater use and the reliability of existing groundwater uses? These criteria have a strong relationship to socioeconomics and water dependability.

Climate Change – There should be some criteria regarding the most likely future water supply availability consistent with current state of Washington direction on this topic.

Columbia River – What would Ecology and others like to see improve relative to flow regimes in the Columbia? Do any actions in the Basin benefit the Columbia?

Flood Control - What changes can be made in existing flood control facilities and management? How do other actions impact flood control?

6-9 **Existing Infrastructure** – Can existing irrigation system and other infrastructure (freeways, diversions, railroads, etc) be managed differently to improve the other elements? This SEIS does a much better job of responding to this issue than the PR/EIS.

Fish Populations – What actions will fish management and fish reintroduction effect? What new infrastructure will be required to reintroduce fish? How will flow and/or infrastructure and/or existing population management schemes have to change if reintroduction plans are implemented?

Fish Habitat - Will actions benefit the quantity, quality, and diversity of habitat within the basin?

Natural Resource Issues - How will actions affect wildlife, wilderness, etc?

Without a holistic approach with identified project proponents or implementers, linked to criteria the SEIS becomes more or less of a grab bag of projects with little rhyme or reason for what elements are included in the document, and small incentive for existing and future collaborators to cooperate or support the "package" or any individual elements.

Specific comments on the text:

Comment	Page	
6-10	2-5	Insert "and" before "in the Gap to Gap reach".
6-11	2-6	Probably need to include TMDL actions in the No Action.
6-12	2-16	Tieton Dam discussion – Discuss McAllister Meadows floodplain complex linked to NF and SF Tieton, Indian Creek, etc. spawning areas.
6-13	2-18	Modification of existing facilities should include of the Flood Control Rule Guidelines for situations like this year. Also need to recognize that reintroduction of fish will drive related operational changes to these facilities.
6-14	2-26	Flip flop (in combination with diversions for irrigation and municipal water supply) also creates low flow in the Naches River through the irrigation season.

6-15 2-30 Yakima County CFHMPS do not have any effect in the Kechellus to Roza Reach. These activities should be moved to the next Reach down.

6-16 2-31 Should mention water star grass in the Prosser Dam to Columbia Reach. Also the correct CFHMP for this Reach is the Lower Naches.

6-17 2-36 Ecology should provide a much greater description of why they believe there will be "uncertain" water supply availability in July and August, and also what criteria was used to eliminate direct pumping from the Columbia from consideration. If Ecology is concerned about flows in the Columbia during July and August, it should consider a pumping scheme that diverts water when water is available and transfers water during July and August. The intent of NOAAs flow targets is to protect the Fall Chinook run in the Lower Snake. A transfer of water during July and August (i.e. increased outflow from the Yakima on a 1:1 basis for withdrawals at Priest or Wanapum) would have no effect. Increasing flows from the Yakima in July and August as a result of pumping during April, May, June and September would benefit the Columbia System and should be achievable under the current regulatory scheme – this is the same regulatory scheme that's being examined for other storage sites in the Columbia. The difference in the Yakima, is that storage facilities already exist that can be managed differently to take advantage of a straight piping alternative. Not releasing water from an existing storage facility if water is supplied by another means is essentially new storage and would meet Ecology's objectives in both the Columbia and Yakima basins.

6-18 3-7 Lake Kachess was actually two lakes - Big and Little Kachess. That configuration would have actually maximized the amount of shoreline spawning area available for Sockeye, as well as having a significant effect to attenuate flood flows.

6-19 Table 3-4 Flows in the Bumping River are not natural, but are managed. The average hydrograph may be close to the natural average hydrograph, but the yearly changes between what natural flows were versus managed flows are quite different. Peak flows are much reduced and summer flows are increased, especially late in the year when the water released is at its warmest.

6-20 Ahtanum Creek flows are reduced in the winter since the AID does divert year-round, summer flows are greatly reduced also.

6-21 There should be additional entries in this table specific to the Columbia River.

6-22 3-21 Need thorough discussion of Columbia River flow issues on this and succeeding pages. The relationship between the Yakima and Columbia need more detailed discussion - in terms of the potential diversion locations at Wanapum, the limiting factors for salmon productivity in the Hanford Reach (i.e. flow fluctuation) and the flow criteria established by NOAA. The NOAA flows should be depicted graphically on a map in addition to the text. The question of how flows in these two rivers can be managed to maximize benefits to both should be discussed.

Comment Letter No. 6

6-23 3-59 Any reference to the Economic Analysis in the January 2008 EIS should be deleted and a new Economic Analysis performed. The analysis in that EIS does not follow the procedures laid out in the P&Gs, does not include the entire basin (large parts of Benton County and other irrigation districts are left out) and we all recognize that the current supplementation of irrigation water with Groundwater will likely not be able to continue into the future. In short, the Economic Analysis in the January EIS is so disconnected from current and future risk and past realities regarding the effect of drought/unreliable water supply as to act as a lodestone around the next of any future proposals to modify the existing water storage and distribution system to meet any economic goals.

6-24 4-8 Section 4.5 is entirely inadequate to the meet the goals and objectives of the EIS. A much more thorough groundwater discussion is necessary to truly evaluate the effects of the alternatives, especially the no action alternative. What does Ecology reasonably foresee will occur with groundwater resources in the Yakima Basin? We know there is mention of inclusion of the USGS Groundwater Study in the succeeding FEIS, but the lack of inclusion of current groundwater trends and future management in this SEIS renders it, and any comments made on it, functionally meaningless.

6-25 5-3 The Fish passage element should be discussed in terms of the Viable Salmonid Populations. Fish passage does multiple things in terms of productivity, persistence, adaptability/diversity, etc. This should occur in both the short term and long term discussions.

6-26 5-4 The EIS should evaluate the assumption that the reservoirs will continue to be managed as they are currently. Examples of re-introduction efforts in the Lake Washington system, the Baker Lake system, White River, etc. are available. The effects of these actions on reservoir and shoreline management need to be considered in this or subsequent EISs – especially the relationship between existing management for fish flow targets and how reintroduced species may change fish flow (or in the case of reservoirs stage or water level management). Protection and management of fish species is a purpose of the BOR Yakima Project, therefore the policy direction to change management in response to reintroduction is already in place. That changes (not necessarily negative changes from a water supply perspective) will occur, and that the tradeoffs for flow management between species will need to be addressed, should be discussed in the SEIS.

6-27 Table 5-1 Table should be re-titled as water is not really saved by these actions. The intent of the action (I think) is to maximize increase the conveyance capacity of the existing ditch system so water can be conveyed/delivered more reliably to the terminus of the ditch. So the title should be, for example, "Estimated Reductions in Water Conveyance to Existing Laterals" or something along those lines.

6-28 Page 5-19 Second paragraph. The BOR's analysis was somewhat constrained by their reliance on the RIVERWARE program. This description of flows in the lower Naches may be true at the Naches at Naches Gage, but is not necessarily true for the Reach given the size of the diversions below the gage relative to the amount of flow in the river. The

6-28 majority of the flow is diverted below the gage but is not reflected in the gage data. IF the statement in this EIS and the January 2008 PR/EIS were true, there would have been no need to purchase the Wapatox by the BOR, and no need to complete the Wapatox upgrades. Even with the Wapatox purchase there will still be significant diversions by the SNID, Kelly-Lowry, City, Gleed Ditch, Yakima Valley Canal, McCormick Ditch, City/Naches Cowiche/Fruitvale and Old Union Diversions. Ecology does not necessarily need to be bound by the same RIVERWARE dataset and can, with its own resources regarding the amount of diversions in the lower Naches, come to its own conclusions regarding the degree to which flows are modified in the lower Naches.

6-29 5-26 Skimming flows by Wymer. If diversions are reduced at Roza (for hydropower production), Wymer could skim at even lower flows. It is our understanding of the Roza right that filling Wymer may have precedence over generation of hydropower by the BOR.

6-30 5-49 The fish passage element should also discuss long term benefits to wildlife/ecosytems from fish passage and the reintroduction of anadromous fisheries.

Comment Letter No. 6 – Yakima County Board of Commissioners

6-1	Comments noted.
6-2	Comments noted. The references to the economic analysis in the January 2008 Planning Report/EIS are to the Socioeconomics sections prepared for the State Alternatives and not to the benefit-cost analysis that Reclamation prepared for the reservoir proposals. Additional economic analysis, including appropriate benefit-cost analysis, would be required of any major construction proposal carried forward from the Integrated Water Resource Management Alternative. This analysis would occur during project-level evaluation.
6-3	Comments noted. Additional information has been added to the Final EIS regarding why Ecology is not pursuing direct pumping from the Columbia River at this time. As stated in Section 2.4.2, the storage projects listed in Table 2-5 could be feasible in the future if they are evaluated under new criteria and circumstances, but are not feasible at this time. Ecology and Reclamation are initiating the implementation planning phase of the Integrated Water Resource Management Alternative. They are initiating a Work Group to provide advice on implementation of the alternative. One of the tasks of the Work Group will be to develop a ranking system to evaluate the priority of the proposed projects in the Integrated Water Resource Management Alternative. Both Yakima and Benton County have been invited to participate in the Work Group.
6-4	As stated in Section 2.4.2, Ecology consulted with Reclamation concerning the possibility of altering the “flip-flop” flow regime. Ecology and Reclamation determined that a change was not possible on its own because of Reclamation’s obligations to provide irrigation water and meet fish target flows. However, modification of the “flip-flop” regime may be possible in conjunction with new storage projects. This option was considered in Sections 2.3.4.1 and 2.3.4.2.
6-5	The Integrated Water Resource Management Alternative presented in the Supplemental Draft EIS and modified in this Final EIS includes elements that require additional water and elements that do not require additional water. Most of the habitat benefits proposed in the Integrated Water Resource Management Alternative would occur as a result of fish passage and habitat improvements. Reclamation conducted its benefit-cost analysis in accordance with the *Principles and Guidelines* (U.S. Water Resources Council, 1983) which have been in place since the Reagan administration to evaluate water projects proposed for federal funding. Any storage project proposed for construction with federal funds would have to undergo an economic analysis under the same guidelines unless those guidelines are changed by Congress. Ecology believes that the proposed Integrated Water Resource Management Alternative is a “credible action plan” to improve water resource issues in the Yakima basin. See Section S.1 regarding the implementation plan phase of this project. Ecology and Reclamation are convening a Work Group to help develop the implementation plan. Yakima County has been invited to participate in the Work Group.

6-6	Comment noted. The RiverWare modeling performed for the Final EIS includes periods of flow when water is available to be stored. Presumably that storage could reduce flooding in downstream areas. Reclamation is performing studies of the potential impacts of climate change on reservoir operations.
6-7	Comment noted. The project was not found on any lists of habitat enhancement or fish passage projects; however, it can be added in the future and its omission from this EIS does not preclude its implementation as part of the Integrated Water Resource Management Alternative.
6-8	See the response to Comment 2-2 regarding prioritizing projects and criteria for prioritization. The objectives to assist in determining the priority of specific projects have been more clearly identified in the Final EIS.
6-9	See the response to your Comment 6-3 regarding criteria for evaluating elements of the Integrated Water Resource Management Alternative. The criteria included in the Final EIS include several of the items you suggest.
6-10	The text has been corrected in the Final EIS.
6-11	A reference to the ongoing TMDL process in the Yakima River basin was added to the No Action Alternative in the Final EIS.
6-12	Information about McAllister Meadows was added to the text in the Final EIS.
6-13	Comment noted. A modification of flood control rule curves was not proposed for this element. Potential operational changes to reservoirs as a result of fish passage have been included in the Final EIS.
6-14	The text in the Final EIS has been revised to reflect your comment.
6-15	Information on the Comprehensive Flood Hazard Management Plans has been corrected in the Final EIS.
6-16	Addressing problems associated with water star grass is not specifically included as a habitat improvement project in the Integrated Water Resource Management Alternative, but it is included in the Yakima Steelhead Recovery Plan and could be included as a fish habitat improvement project in the future. A reference to the Lower Naches Comprehensive Flood Hazard Mitigation Plan was added to the text in the Final EIS.
6-17	Your comments regarding flows in the Columbia River are noted. Ecology believes that there is still a great deal of uncertainty associated with Columbia River stream flow requirements for ESA listed species. Court decisions could alter current Biological Opinion requirements. That uncertainty makes it difficult to predict any surplus of flows in the river even outside the July/August time period. Section 2.4.4 has been added to the Final EIS to provide additional information about direct pumping from the Columbia River.
6-18	Comment noted.
6-19	Table 3-4 has been revised in the Final EIS.
6-20	Comment noted. Table 3-4 has been revised per your suggestion.
6-21	The effects on the Columbia River for the projects proposed are included in other sections of the EIS; the effects on Columbia River flow are minor and were not seen to warrant inclusion in Table 3-4.
6-22	Comment noted. The information you request, while useful, was not determined to be relevant to the impacts associated with the Integrated Water Resource Management Alternative and was not included in the Final EIS.

6-23	Section 3.13 of the Supplemental Draft EIS refers to Section 5.14 of the January 2008 Draft Planning Report/EIS which describes the potential socioeconomic impacts of the State Alternatives, in compliance with the requirements of the State Environmental Policy Act. As such, it looks at potential socioeconomic impacts from a statewide perspective rather than adopt the perspectives described in the *Principles and Guidelines* (U.S. Water Resources Council, 1983). If some actions included in the State's Integrated Water Resource Management Alternative require expenditure of federal funds by Reclamation, they might be subject to requirements that they be evaluated under the *Principles and Guidelines.* The discussion in Section 3.13 addresses economic issues associated with the entire Yakima River basin, but we have added information specific to Benton County (see also the response to Comment 7-2). Section 5.14 of the January 2008 Draft Planning Report/EIS also addresses the potential economic consequences of using ground water for irrigation, in the discussion of the Groundwater Storage Alternative. Consistent with the programmatic nature of the evaluation, however, it does not attempt to reach conclusions regarding the likelihood that irrigating with ground water will be able to continue in the future. The discussion explicitly addresses past, current, and potential future risks associated with drought and unreliable water supplies, with respect to the full suite of goods and services derived from the basin's water resources. We anticipate that, by addressing the full suite of goods and services, the information the discussion provides about the potential socioeconomic consequences of the State Alternatives will be useful to the evaluation of future proposals to modify the water storage and distribution system.
6-24	As noted in the Supplemental Draft EIS, additional information on ground water in the Yakima River basin has been added to the Final EIS. That information is provided in Sections 2.3.5.
6-25	Text has been added to Sections 2.3.1 and 5.9.2.1 of the Final EIS to address the long-term effects of the Integrated Water Resource Management Alternative on the viability of salmonid populations. It is not expected that any short-term effects associated with the Integrated Water Resource Management Alternative will affect the viability of salmonid populations; therefore, it is not discussed in Chapter 4.
6-26	Comment noted. It is not possible to provide the level of detail requested in a programmatic EIS. Additional studies, similar to those requested, would be performed in project-level EISs for individual fish passage projects that are carried forward.
6-27	The title of Table 5-1 has been revised in the Final EIS.
6-28	Comment noted. Ecology determined that the RiverWater model was the best and most efficient tool to review flow impacts for this programmatic EIS because it incorporates all the aspects of Reclamation's operation of the Yakima Project. Additional analyses can be performed in future project-level reviews of storage projects in the Naches River basin.
6-29	Comment noted.
6-30	A paragraph has been added to Section 5.8.2.1 of the Final EIS about the long-term benefits of the reintroduction of anadromous fisheries.

Leo Bowman
District 1
Max Benitz, Jr.
District 2
James Beaver
District 3

Board of County Commissioners
BENTON COUNTY

David Sparks
County Administrator

Loretta Smith Kelty
Deputy County Administrator

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JAN 13 2009
DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

12 January 2009

Derek Sandison, Central Region Director
Washington Department of Ecology
15 West Yakima Avenue – Suite 200
Yakima, Washington 98902-3452

Re: Yakima Supplemental Draft

Dear Mr. Sandison,

Benton County is in receipt of the recent "Supplemental Draft Environmental Impact Statement for the Yakima River Basin Water Storage Feasibility Study" ("Study"), as prepared by the Washington Department of Ecology ("Ecology"). Thank you for the opportunity to provide feedback.

As you are aware, Benton County has followed both the joint and separated processes of the Washington Department of Ecology ("Ecology") and the United States Bureau of Reclamation ("Reclamation") closely and throughout. We have commented previously along the way, and we provided scoping feedback for this Study this past summer (reference, Benton County letter dated 28 July 2009).

7-1

Benton County is not endorsing either of the specific alternatives discussed in this Study at this time. Ecology has provided analysis of a complex package of options and opportunities in this Study, and we are commenting on that package.

In general, we commend Ecology for getting the Supplemental Draft done in a timely fashion. As noted in our scoping letter, we hoped that this process would be focused and efficient, without an over-expenditure of resources that could be used on beneficial projects instead of endless study. Also, while we still have some concerns, it appears that a good-faith effort was made to address the many suggestions offered during the scoping period by Benton County and other entities.

Comment Letter No. 7

Specific comments on topics discussed in the Study...

Benton County is Part of the Yakima Basin

One of the points we tried to make very strongly in our scoping comments this past summer – and have made before, was the frequent disconnect we observe in Yakima Basin discussions when the lower watershed and Benton County are often found to be absent from such discussions. This occurs over a wide range of topics, from projects, to economics, to habitat evaluations, to simple data collection. In reviewing Section 5.13
7-2 of the Study, beginning on page 5-93, we again found an example of this disconnect. The "Jobs and Income" subsection discusses population and economic trends at some length, but makes references only to Kittitas and Yakima Counties in the text and table, with no citation of trends and data for Benton County; even though the Benton County portion of the Basin has shown the most dynamic shifts and growth in agriculture, commerce, industry, and population over the past decade. We again state that going forward, we hope the Department of Ecology will remember that more Yakima River water flows through Benton County than anywhere else.

Increased Water Storage

The Study evaluates both surface and sub-surface new storage opportunities, and most of the focus is on two variations of a possible Bumping Lake expansion. One of the
7-3 goals of this Study process, as stated in the original report of January 2008 is to improve and maintain the water supply for proratable users by not less than 70% in "dry years", while maintaining basic in-stream and municipal needs.

Reclamation's assessment of the "Bumping Lake – Large" option is that while it would help meet irrigation supply needs much of the time, it would not be able to meet the 70% threshold in the third or subsequent years of a prolonged drought. Certainly the "Bumping Lake – Small" option would be even less effective. Given the future climatological changes that are assumed by both Reclamation and Ecology, we are
7-4 concerned about the ability to even fill either version of the enlarged Bumping reservoir on a dependable basis. In this current Study, Ecology assumes a different reservoir management scheme whereby more water would be retained at Bumping and used for drought years only. This would probably help address the concern we have, but it still has the flavor of "incremental remedies" to deal with a larger issue.

Integrated Approach

The "Integrated Water Resource Management Alternative" package that Ecology has assembled and evaluated is to be commended for its comprehensive and holistic
7-5 approach. However in looking at this option, we are left with two threshold concerns that have not been adequately addressed.

The first concern, is for the ability of the region to even come close to implementing this package if it is chosen as the path forward. In concept, all of these otherwise disparate

7-5 pieces are connected in the "big picture"; but in actuality what has been presented is a myriad of individual projects requiring exhausting episodes of further review and approval. This is not even to mention the cooperation of untold numbers of entities and of funding sources that are equally numerous and as yet unidentified. How much of this package could realistically be implemented even within the first decade? In its "next steps", "path forward", or equivalent section of the Final EIS, Ecology needs to discuss implementation of this alternative or a revised version thereof if it is indeed selected by the Ecology-Reclamation team. The water resources managers need to "get real" with the affected public, and lay-out a credible action plan for how this type of approach would be accomplished within an acceptable timeframe.

7-6 The second threshold concern again calls into question the efficacy of the "integrated approach" as analyzed in the Study. As stated above, we are not convinced that adequate storage for fisheries, municipal, and irrigational needs are accommodated in this approach, even with full implementation of all other aspects of this alternative. Climate changes and the geographical realities of the Bumping basin leave us wondering just how achievable a fully-performing Bumping Lake really is.

Again, we appreciate your work on this important issue, and we appreciate the opportunity to provide feedback. We look forward to seeing the Final EIS later this spring.

Sincerely,

BOARD OF COUNTY COMMISSIONERS

Max E. Benitz, Jr.

Max E. Benitz, Jr., Chairman

cc: Board of County Commissioners – Kittitas County
Board of County Commissioners – Klickitat County
Board of County Commissioners – Yakima County
Jeff Tayer, Director (Region Three) – WDFW
Alex Conley, Executive Director, YBFWRB
Chuck Klarich, YBSA

Comment Letter No. 7 – Benton County Board of Commissioners – Max Benitz

7-1	Comments noted.
7-2	Ecology recognizes that Benton County is part of the Yakima River basin and has included references to the County where appropriate. Benton County has been invited to participate in the Work Group that Ecology and Reclamation are establishing to provide advice on the implementation plan for the Integrated Water Resource Management Alternative. It is true that many of the proposed projects are located in the upper basin. This is because many of the fish passage problems and habitat degradation are located in the upper basin. Similarly, the best location for storage projects is in the upper basin. It is anticipated that these projects will benefit fish and water supply in Benton County, even though the projects are located outside the County. Projects such as the Kennewick Irrigation District Pump Exchange Project, which is located in Benton County, are included in the Integrated Water Resource Management Alternative. Text has been added to Section 5.13.1.2 in the Final EIS regarding demographic information for Benton County. Benton County population data have been added to Table 5-23 in the Final EIS.
7-3	The Congressional authorization for Reclamation's Yakima River Basin Storage Study is qualitative and does not include any quantification of the amount of water needed to meet the goals. The authorization states: "The Secretary of the Interior, acting through the Bureau of Reclamation, shall conduct a feasibility study of options for additional water storage in the Yakima River Basin, Washington, with an emphasis on the feasibility of storage of Columbia River water in the potential Black Rock reservoir and the benefit of additional storage to endangered and threatened fish, irrigated agriculture, and municipal water supply" (Section 214 of the Act of February 20, 2003 (Public Law 108-7)). For the purposes of its study, Reclamation developed goals that quantify the amount of water for nonbinding flow objectives, irrigated agriculture and municipal water supply. Those goals provide for not less than a 70 percent irrigation water supply for proratables during dry years (896,000 acre-feet) and 82,000 acre-feet for municipal use to meet population growth to the year 2050. To meet its State Environmental Policy Act requirements to evaluate reasonable alternatives, Ecology determined that the objectives of the Storage Study are to provide additional water supplies for anadromous fish and irrigated agriculture as well as for future municipal growth. Ecology followed the guidelines of the Congressional authorization and did not attempt to quantify the amount of water needed to meet the objectives stated in the authorization. Ecology believes that using the broader Congressional objectives allowed it to evaluate a range of alternatives that could feasibly attain or approximate the proposal's objectives at a lower environmental cost or decreased level of environmental degradation (WAC 197-11-440(5)).

7-4	See the response to your Comment 7-3 regarding use of the 70 percent criteria. As stated in Section 2.3.1, the Integrated Water Resource Management Alternative should be taken as a package alternative, and the potential of meeting specific goals should not be separated by component.
7-5	Your comments regarding implementation are noted. Additional information has been added to Section S.1 regarding implementation of the proposed Integrated Water Resource Management Alternative. Ecology and Reclamation are moving forward with developing an implementation plan.
7-6	Comments noted. Bumping Lake or a similar storage project in the Naches River basin is not intended to supply all the water for fish, municipal, or irrigation needs. Storage is only one element of the integrated alternative. Ecology believes that by implementing the other elements, such as enhanced conservation, improvements to existing irrigation facilities, and water marketing, some of the municipal and irrigation needs can be reduced. Improvements to fish passage and fish habitat would improve the health of fish in the basin. Other smaller storage projects, including ground water storage, may supplement any water supply that could be provided through a Naches River basin storage facility.

Comment Letter No. 8

From: Roger Satnik [mailto:krdgis@fairpoint.net]
Sent: Thursday, January 15, 2009 10:06 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

Mr. Sandison,

Here are the Kittitas Reclamation District's comments on the Supplemental Draft Environmental Impact Statement Yakima River Basin Water Storage Feasibility Study.

Study comments:

8-1 Changes to the KRD system are mentioned in many of the alternatives, but the impacts of these proposed changes to the KRD are not discussed. There would be costs to the KRD for operation and maintenance associated with the changes.

8-2 Page 2-20. The beginning of the SB14.3 lateral is at the same elevation as the Manastash Creek diversions. If pumping water to KRD users is to be used to enhance creek water issues, why not pump water directly to the creek users, or the creek, and leave the KRD out of it?

8-3 Page 2-26. Transferring water from Lake Cle Elum to Wymer would only create new storage capacity if the Lake is full and water being released (passed through the reservoir) is not being used to meet downstream demand. Very little benefit for very large cost.

8-4 Page 2-28. The KRD system operates mid-April through mid-October, not March through November.

8-5 Page 5-6. The 30% estimate of water lost is from the diversion to the landowner headgate. Unless the Main Canal and South Branch are piped along with the laterals, the estimate of water savings in Table 5-1 is exaggerated.

8-6 Page 5-37. Individual creek water right holders have little incentive to change to the KRD even if KRD capacity limitations were overcome. They would be changing from senior to junior rights, from "free" water to an assessment. The study claims that the potential impacts to the water users are positive, but no positive impacts are explained.

Roger Satnik
Kittitas Reclamation District
509-925-6158

Comment Letter No. 8 – Kittitas Reclamation District – Roger Satnik

8-1	Comment noted. Ecology has consulted with KRD in the development of the proposed projects in the Integrated Water Resource Management Alternative and KRD has been invited to participate in the Work Group that is being establishing to develop the implementation plan for the alternative. The impacts of the costs of any of the elements of the Integrated Water Resource Management Alternative will be evaluated as the elements of the alternative are developed and carried forward.
8-2	Comment noted. This alternative has been added as an option to pumping in order to supply KRD water users.
8-3	Comment noted. A more detailed analysis of this option was performed for the Final EIS.
8-4	The text of the Final EIS has been revised with your correction.
8-5	Water savings estimates have been revised in the Final EIS per your comment.
8-6	There are two alternatives for creek water to be replaced with water conveyed by KRD. In the first instance, individuals who own water rights to divert from a creek would retain the right with its senior priority date and KRD would divert and convey water from its Yakima River diversion to the water user. In the second, KRD would acquire the individual water rights, with their senior priority date, and the water user would become a member of KRD. This would be practical only if there was a sufficient volume of water acquired from water users on the creeks to allow KRD to operate its system during times of proration. An agreement between KRD and the water users regarding assessments has not been addressed at this time. A benefit to the individuals is they would no longer be responsible for their own diversion from the creek with the attendant maintenance problems.

Yakima Basin Storage Alliance

Mr. Derek Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

Dear Mr. Sandison,

9-1 The WSDOE choice of the "3rd Alternative" as its answer to the water supply shortfall in the Yakima Basin is a formula for the three county area of the Yakima Basin to gradually die by attrition.

9-2 First, there is a disregard for the climate information that comes from within the state's own climate research structure utilizing DOE funding. For the past 50 years, data shows a gradually rising freezing level in the Cascades, meaning that 2/3 of the water storage capacity needed from slow-melting high mountain snows is being lost.

Every climate study shows that this loss of snow-holding capacity is being lost at an ever increasing pace. The effect was one drought year out of 10 in the '80s, now down to one year out of four, and the state climatologist tells us to get ready for one year out of two. Two drought years back-to-back will spell the end of many perennial crops, including high-value vineyards and tree fruits.

We expected the BOR study to not consider the above facts because their work could only look back at history. The State of Washington portion of the study could look forward, but failed to do so in a meaningful way. In a normal water year, the Yakima River is already over-appropriated, and the option chosen by DOE will not result in increased water supply capacity that is anything more than a band aid.

9-3 The proposed Bumping Lake expansion will not be built. It has consistently been rejected by the BOR and the environmental community for decades, and while the Yakama Nation and the Roza Irrigation District both want to bring it up again, they want it for different purposes. The DOE study would have done the people of the Yakima Basin a service by not creating false hopes that Bumping could be built and that it would be a good investment, particularly in light of the climate change we are told to expect.

9-4 There seems to be a misconception that has helped lead to an error in judgment in the WSDOE study. It has been said that the concept of water exchange and pumped storage out of the Columbia River "has no water supply benefits above the location of Black Rock stored water".

9-4 This is totally false because the Yakima River System gains 600,000 acre feet of "saved" water that is managed for a variety of uses and flows primarily from and through Kittitas County. Water will be diverted in that County to guarantee 70% to proratable acreage (about half of their total existing irrigated acreage) and the full entitlement to those acres with more senior right, just as it does in Yakima and Benton Counties.

Let me put this another way: While only Roza and Sunnyside Irrigation Districts utilize Columbia River stored water, the Yakima Project benefit for fish, irrigation, municipal and industrial uses is exactly the same in all three counties, and meets all the requirements proposed by Congress.

9-5 In addition, the recreational benefit from managing the Kittitas County reservoirs and streams primarily for fish production is huge. While the BOR has supposed "water neutral" plans for fish access to the reservoirs without Black Rock, the fine print reveals that it requires trucking and operates only in certain months.

9-6 The DOE view is that Black Rock is "too expensive" and they accept the BOR's extensive and expensive analysis of 100 years of costs to finance, build and operate. The nation and the Congress have rejected the current Principles and Guidelines utilized by the BOR and other federal agencies. To be fair, the proposed new guidelines need to be applied to the evaluation of Black Rock, because they include a broader look at benefits, not just costs. If the Black Rock concept is expensive, which it is, let's see what value we are buying for that investment.

The Department of Ecology can do better, and can be fairer in their analysis of what must be done in the Yakima Basin to protect the economy and improve the environment, meet Yakama Treaty Rights, and do the right thing for future generations.

Sincerely,

Sid

Sid Morrison
Chairman, Yakima Basin s Storage Alliance
P.O. Box 30
Prosser, WA 99350

cc: Elected Officials

Comment Letter No. 9 – Yakima Basin Storage Alliance – Sid Morrison

9-1	Comment noted.
9-2	The Supplemental Draft EIS included information on climate change impacts (Sections 3.2 and 5.2). The Supplemental Draft EIS also referenced the climate change section of the January 2008 Draft Planning Report/EIS. Both documents acknowledge that snowpack in the Yakima River basin has declined and that climate change will likely add to that decline. The Supplemental Draft EIS noted that the University of Washington's Climate Impacts Group was studying specific climate change impacts in Washington, including the Yakima basin, and that results of that study would be included in the Final EIS. The results of the study were released in February 2009 and have been incorporated into Sections 3.2 and 5.2 of this Final EIS.
9-3	Ecology acknowledges the considerable controversy that has been associated with the expansion of Bumping Lake over the years. Ecology included expansion of Bumping Lake in its Integrated Water Resource Management Alternative for two reasons. First, it was included at the request of the Yakama Nation and Roza Irrigation District, the two largest proratables in the basin. The Bumping Lake alternative presented in the Supplemental Draft EIS assumes different operating conditions than were used by Reclamation. These operating conditions were developed in coordination with Reclamation, the Yakama Nation, irrigators, and fish interests in the basin. These operating conditions make the expansion more feasible than under the conditions proposed by Reclamation. Table 2-1 summarizes the different assumptions between Reclamation's Bumping Lake Expansion and the one included in this EIS. Second, expansion of Bumping Lake is included in the Integrated Water Resource Management Alternative to serve as a proxy for water storage in the Naches River basin. Ecology and others believe that the Naches River basin would be a good location for a new storage facility, but Ecology has not had the ability to study other sites in detail. The studies that have been done on Bumping Lake expansion provide adequate information to allow Ecology to model the water budget in the Naches River basin to determine how much water could be stored and still meet flows needed to maintain fish.
9-4	Ecology has searched the document and does not find such a statement in the December 2008 Supplemental Draft EIS. No pump exchange or storage projects were evaluated in the Supplemental Draft EIS.
9-5	The Integrated Water Resource Management Alternative proposes adding fish passage facilities to all five major Reclamation storage dams. Ecology and Reclamation are beginning to study fish passage facilities and fish reintroduction at Cle Elum Dam through a separate EIS. Currently it appears that the best option for providing upstream passage for adults would be through a trap and haul program. This program would be operated from March to late December, which coincides with the time that adult salmon would be migrating upstream. Downstream passage for juvenile fish would be provided by a multi-level gated concrete intake structure and a conduit through the right abutment of the dam. This facility would provide year-round passage for juvenile fish.

9-6	Comments noted. Additional information has been added to the Final EIS to explain why Ecology does not support the Black Rock proposal (Section 2.4.1). Although there have been several efforts to revamp the *Principles and Guidelines* over the years, the *Principles and Guidelines* used by Reclamation are still the ones required for any federally funded water project. Those *Principles and Guidelines* would be used for any water project proposed for federal funding under the Integrated Water Resource Management Alternative.

Ann Root

From: Sandison, Derek (ECY) [DSAN461@ECY.WA.GOV]
Sent: Monday, January 19, 2009 11:51 AM
To: Ann Root
Subject: FW: Yakima Supplemental Draft

Attachments: SEIS comments.doc

SEIS comments.doc
(152 KB)

-----Original Message-----
From: Alex Conley [mailto:aconley@ybfwrb.org]
Sent: Saturday, January 17, 2009 5:36 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

Derek,

I hope the attached comments are still of use; they are primarily editorial in nature, and should be easy to address in the editing process. There are two sections- the Appendix C tables & section
3.9.1.4- that would benefit from slightly more intensive review and editing, and I would be glad to work with Ecology and its contractors in that process as time allows. These comments were prepared at a staff-level and do not represent a formal statement of policy by the Yakima Basin Fish & Wildlife Recovery Board.
Based on previous Board-level discussions, the Board is strongly supportive of Ecology's efforts to develop an integrated approach to habitat improvement, and is encouraged to know that elements of the Yakima Steelhead Recovery Plan developed by the Board have been incorporated into this proposal. The Board has not taken a consensus stance on any of the associated storage proposals, though individual Board members may have expressed opinions through other processes.

Please do contact me with any questions.

Sincerely,

Alex Conley

Executive Director
Yakima Basin Fish & Wildlife Recovery Board PO Box 2662 Yakima, WA 98907
509 453-4104
aconley@ybfwrb.org

Comment Letter No. 10

Comments on the December 2008 Supplemental Draft Environmental Impact Statement for the Yakima River Basin Water Storage Feasibility Study

10-1 Prepared by Alex Conley, Executive Director of the Yakima Basin Fish & Wildlife Recovery Board on January 16th, 2009

Please note that these comments have been prepared at a staff level and are editorial comments meant to help improve the quality of the draft document. They have not been approved by the Board at this time, and do not represent a formal policy statement by the Yakima Basin Fish & Wildlife Recovery Board.

10-2 P3-3, 2nd ¶:
Chinook salmon are not listed under the ESA in the Yakima Basin; please correct.

Figure S-1:

10-3 1) There are significant opportunities for habitat improvements in the unmarked reach Between Mabton and Horn Rapids. Habitat work in this reach should also be eligible for inclusion in the proposed integrated program.

2) The reaches marked in yellow exclude numerous areas that should be a part of the integrated habitat program, and should be revisited. For example, only the lower reaches of Cowiche, Swauk and other creeks are shows, even though proposed fish habitat restoration projects have also been proposed higher up in those systems. Other streams (e.g. NF Teanaway, Nile and Rattlesnake Creeks and others) are not shown at all.

Section S.5.2:
10-4 This section would read better if short and long term impacts were described sequentially within each topic area. 10-5 The description of Fish and Aquatic Resources on p S-13 should acknowledge that expansion of Bumping Lake may have impacts on listed bull trout that spawn in Deep Creek and the Upper Bumping River, and that these will need to be reviewed if this proposal is further developed.

10-6 Last ¶ on S-15:
The phrase "to a stage reservoir" does not make sense; also the last sentence is an exact repeat of third to last sentence and should be deleted.

10-7 Fig 1-1:
Again blue markings for streams cover all of some streams, but only the bottom ends of others.

10-8 P1-5:
4th bullet: switch order of "blocked access to side channels" and "degraded floodplain habitat" to clarify meaning.

5th bullet: change "riparian vegetation communities" to "riparian areas"

9th bullet: add "(flip-flop)" after the reference to "The annual late summer river operation"

10-9 P1-6, Section 1.3.1: Note that a 6th reservoir, Clear Lake, is also part of the Yakima Project.

10-10 Fig 1-2: Why isn't the Satus Unit of the Wapato Irrigation Project shown on the map?

10-11 P1-9, 1st ¶:
The first reference to steelhead numbers from 1985 to 2008 is incorrect; the range of 6,700 to 37,000 is for Chinook, and the text needs to be changed accordingly. Extending that series back into the 80s would significantly reduce the lower end of the range.

10-12 P2-4, Section 2.2.7:
Rather than simply focus on the request for 2008 SRFB funding, we would propose the following language be changed as below:

The Yakima Basin Fish and Wildlife Recovery Board (YBFWRB) is the lead entity responsible for coordinating SRFB grant applications in Yakima, Benton and Kittitas Counties. Between 1999 and 2008, the Yakima Lead Entity has had 52 projects approved for over 9.7 million dollars of SRFB funding. ~~For 2008 project applications, the YBFWRB has submitted approximately $2.3 million for funding of project proposals~~, all of which include funding matches from various state and federal funding sources (i.e., WSDOT, BPA). The YBFWRB has allocated funding to project sponsors for projects such as providing fish passage and screening at small irrigation diversions, planting riparian areas, acquiring and protecting land with high priority fish habitat, restoring natural stream channel functions, and promoting fish-friendly agricultural practices. ~~The YBFWRB submitted proposals for eight similar projects for 2008. The decision on funding is expected December 13, 2008.~~
, "~~Since 1999, the Yakima Lead Entity has had 52 projects approved for over 9.7 million dollars of SRFB funding.~~

10-13 P2-5: I believe the reference to the Cascade Conservation Partnership (which ran from 2000 to 2004) was intended to refer to the Cascade Land Conservancy, a non-profit organization that is currently active in the basin.

10-14 Fig 2-1 and 2-2: See earlier comments on extend of mapped streams under Fig S-1 and Fig 1-1.

10-15 P2-13, 2nd ¶:
Chinook in the basin are not listed under the ESA; steelhead are, but are not referenced in this paragraph. Add reference to benefits to ESA-listed steelhead and bull trout.

10-16 P2-14 Section 2.3.2:
Add a reference to the existence of Clear Lake reservoir and the need to improve passage at Clear Lake dam in order to realize the full benefit of providing passage at Tieton Dam.

10-17 P2-16 First sentence on page is repetitive and should be removed. Entire description presumes maintenance of the current configuration of Bumping Lake Dam. Any enlargement plans, as also proposed in this document, would significantly change both the physical description of the passage facilities and reduce the extent of tributary habitat available upstream of the reservoir (as some portion of the Bumping River and Deep Creek would be inundated). This should be acknowledged in the text.

10-18 In the last ¶, note that the presence of kokanee and bull trout is known (the text states that "kokanee and bull trout may reside in the reservoir").

10-19 P2-17, 2nd ¶: The mileages given for the North Fork and its tributraies are only available if improve passage is secured at Clear Lake Dam. Improving passage at Clear Lake Dam should be a requisite component of any effort to provide passage into Rimrock Reservoir.

10-20 P2-17, 2nd to last ¶: Habitat improvement projects in Gold Creek could remedy these passage problems, which do not occur in all years or seasons. This work should be included as part of the integrated proposal.

10-21 P2-18 2nd ¶: low-flow passage conditions in Box Canyon Creek and the Kachess River only occur in some years, and could be addressed through habitat actions that should be included in the integrated proposal.

10-22 P 2-18 Section 2.3.3: There are additional operational changes to existing facilities that should be investigated/implemented as part of the intergrated option. These can create improved conditions for fish migrations and rearing without negatively affecting water supply and flood control benefits of the Yakima Project. Initial efforts to implement these actions are being made by the Bureau as part of the no-action alternative, but additional work would be possible as part of Ecology's proposed action. The three most significant groups of proposed operational changes are:

- Changing spring operations to improve spring migration conditions for fish by developing improved operational rules that include improving assessments of risk to water supply and flood control (See Basinwide Action #1 in the Yakima Steelhead Recovery Plan);

- Addressing some of the impacts of flip-flop through changes to late summer water operations. While eliminating flip-flop is a significant change that would require either new water supply infrastructure or major changes in how risk is distributed between different fish species and interests, there are smaller changes in ramping rates, spawning flows, etc that may be able to reduce negative impacts of flip-flop without impacting water supplies to downstream users (see Upper Yakima Action #3 and Naches Action #4 in the Yakima Steelhead Recovery Plan);

10-22
- Exploring opportunities to use water dedicated to instream use (via YRBWEP conservation projects and other avenues addressed in the Ecology alternatives of the Yakima Basin Storage Study) to meet specific flow needs for fish (e.g. supplementing flows below Parker in key periods, providing pulse flows to enhance spring outmigration survival or to trigger upstream movements of adult migrants in summer conditions, or improving winter flows below reservoirs).

10-23 Section 2.3.3.3 should be expanded to include the option of working with the Kittitas Reclamation District to make significant improvements to their mainline canals as well as their laterals in order to facilitate both the improvement of instream flows in key tributaries and to allow improved flexibility in water management for irrigators, especially in drought years.

10-24 Under the 2nd ¶ of 2.3.3.4 note that consolidating the treatment plant and Gleed diversions with the Wapatox Canal would also allow for significant improvements in floodplain function for over 2.5 miles of the Naches River.

10-25 P2-25, last ¶: add the word 'negative', to the phrase "without affecting flow targets for fish" so that it reads "without negatively affecting flow targets for fish"

10-26 P2-30 first full ¶: Note that the Upper Yakima Flood Hazard Management Plan covers the Yakima River below Roza (it covers the upper portion of that part of the Yakima River that is in Yakima County). The reference should be removed from this section and added to the list of plans for the Roza Diversion to Prosser Dam section. The Yakima Nation Riparian and Wetlands Restoration project should also be added to the list for the Roza to Prosser section.

10-27 Table 2-1: Add Rattlesnake and Nile Creeks to the list (for all attributes but fish passage). Add fish passage to the list for Swauk Creek; add riparian enhancement for Taneum Creek.

10-28 P2-36 Section 2.4.2: As noted earlier, while eliminating flip flop will likely require changes to Yakima Project infrastructure, adjustments to flip-flop can be made with current infrastructure and should be fully assessed.

10-29 P2-36, Section 2.4.3: Given that the limitations on direct pumping are primarily due to policy, and not technical feasibility, it would be good to at least look at the conceptual level analyses of direct pumping options (perhaps limited to drought years), including the use of direct pumping with rereg reservoirs for balancing wind power supplies (and potentially to supply winter aquifer recharge to offset summer flow impacts).

10-30 Figure 3-2 is mislabeled; it shows the groundwater basins from the USGS groundwater study, and not surface water drainage basins, as the figure caption implies.

10-31 Section 3.1:
The use of the the groundwater basins designated in the USGS study to refer to much larger surface water drainages in 3.1 is problematic and should be revisited. If the primary concern is ground water aquifers, the surrounding uplands should be indicated as the source watersheds of the given groundwater basin, and not as part of that basin. If the primary interest is surface water drainages, more conventional designations (WRIAs, 4th field watersheds, etc) should be used.

10-32 Section 3.2 should be revised to incorporate information from USGS's Scientific Investigations Report 2008-5124, Effects of Potential Future Warming on Runoff in the Yakima River Basin, Washington.

10-33 Section 3.3.1 and 3.3.5:
Again, improved passage at Clear Lake Dam should be a part of the proposed action and will be required to realize the full benefits noted in 3.3.3.5.

10-34 Section 3.3.4.2:
Please note that a portion of the water rights in Swauk Creek and its tributary, First Creek, have been dedicated to instream use since Haring's data was compiled.

10-35 Section 3.3.4.3:
Please note that current fish passage facilities on Taneum Creek only provide partial passage, and that work is currently underway to provide year-long passage for both adult and juvenile salmonids.

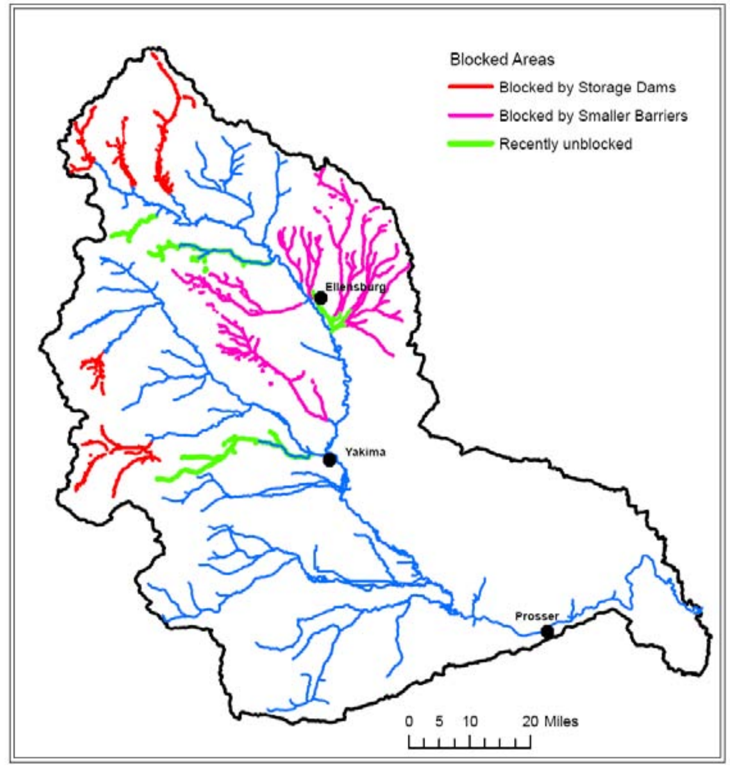
10-36 Table 3-4:
The assumption that summer flow below the Chandler Canal return is significantly reduced compared to unregulated conditions warrants revisiting; primary issues in this reach are water quality (temperature and DO); return flows mean that summer flows in this reach are significantly higher than the rest of the Yakima mainstem below Parker.

10-37 Section 3.9.1.2: Note that the barrier on Big Creek has been modified to allow fish passage, and that the barriers on Taneum Creek have partial fish passage, and are being modified to allow full passage. Barriers in Satus Creek are falls in the headwaters; current text indicates that they may be constructed barriers. Ahtanum Creek and Toppenish Creek also have at least partial fish passage up to natural barriers in the headwaters.

10-38 Also consider including the map we provided as part of the scoping process and pasted below that identifies extend of potential anadromous access and areas blocked by human-made structures; we would be glad to work with you to provide the underlying GIS data. This map is based on modeling of the extent of historic steelhead habitat completed by NOAA fisheries and described in detail in the Yakima Steelhead Recovery Plan, Chapter 2.

Comment Letter No. 10

10-38



10-39 P 3-46 2nd ¶ of Fall Chinook section: Low end of abundance record is incorrect (1,1120). Please replace with correct value.

10-40 Section 3.9.1.4 would benefit from a tighter organization and better references, and currently includes some incorrect information and significant ommissions. We would be glad to work with ecology and its contractors to improve this section.

10-41 P 3-51, 1st ¶: Note that Pacific lamprery are an anadromous, not resident species, and should be removed from this list and added to the discussion in 3.9.1.3.

10-42 P3-51, 4th ¶: I assume reference to "Naches Lake" should read "Naches River"

10-43 P5-49, 2nd ¶ of 5.8.2.3: Text on this page notes that the large-reservoir option for Bumping Lake would increase lake area from 1,300 to 4,120 acres, which is over a 3-fold increase. In contrast, Figure 2-4 shows at most a doubling of the lake area. Likewise, the 4th ¶ of 5-73 indicates that 10 miles of stream habitat would be inundated, while figure 2-4 appears to show only ½ that length within the proposed reservoir footprint. Given that inundation issues will be at the fore in any analysis of Bumping expansion, this discrepancy should be rectified.

10-44 Table 5-17 should have a legend.

10-45 The first ¶ of p5-57 is grammatically problematic and should be reworked for clarity.

10-46 P5-57: Note that these have been efforts to estimate abundances of anadromous fish that could be produced in and above reservoirs (see the Bureau studies). These should be included, especially as sockeye have the potential to dramatically increase the overall abundance of anadromous fish in the Yakima Basin.

10-47 Table 5-18: Note that Cold Creek could provide habitat if the passage barrier associated with the old railroad crossing at the mouth were re-repaired. Also note that much of the mileage indicated above Tieton Dam is only available if full passage is also assured at Clear Lake Dam.

10-48 P5-80, Section 5.9.3, 2nd ¶:
Again, Chinook populations in the Yakima Basin are not listed under the ESA. Please correct this section.

10-49 Table C-1: This table needs to be reworked; it is based on 2001 data that was only partially correct and needs to be updated to reflect better information and improvements to passage since 2001. We'd be glad to help update the table. Specifics include:
Big Creek passage barrier has been removed; adjust reference accordingly. Several Reecer Creek and Wilson Creek diversions have also been removed. Ahtanum Creek reference is incorrect, as anadromous fish have access into all three forks. Toppenish Creek barrier listed is incorrect, as there is anadromous access far above that. Satus Creek lists Bruton Diversion as barrier; Bruton is actually on Taneum Creek; all major anthropomorphic barriers on Satus have been removed except the highway culvert on Shinando Creek. Cowiche Creek has several partial barriers remaining, though major barriers have been removed over the last 5 years.

Some of data in C-2 is also out of date (eg Big Creek barrier has been removed)

Tables C-3 to C-6 should also be reviewed for accuracy.

Comment Letter No. 10 – Yakima Basin Fish and Wildlife Recovery Board – Alex Conley

10-1	Comment noted.
10-2	The Final EIS text has been corrected.
10-3	Figure S-1 is included to illustrate the potential benefits from the elements of the Integrated Water Resource Management Alternative. It is not intended to identify all the areas with potential improvements, but to provide a general picture of improvements. Potential benefits are discussed in more detail in the following chapters.
10-4	Your comments are noted. The format of the Summary is parallel to the format of the rest of the EIS and was not changed.
10-5	The Final EIS text has been revised per your suggestion.
10-6	The typographical error has been corrected in the Final EIS.
10-7	Comment noted. GIS data layers including the extent of streams were obtained from public sources and did not show the entire length of each stream. Since the figures in the EIS show stream locations for illustration purposes and not for analysis, they were not revised for the Final EIS.
10-8	The Final EIS text was changed per your suggestions.
10-9	Information about Clear Lake has been added to other sections of the Final EIS, but was not added here because it is not a major storage reservoir.
10-10	Figure 1-2 has been revised in the Final EIS to show the Satus Unit.
10-11	The information on fish numbers has been revised in the Final EIS text.
10-12	Section 2.2.7 on the Salmon Recovery Board has been revised per your suggestions.
10-13	The Cascade Land Conservancy has been added to the list of private conservation groups.
10-14	See the response to your Comment 10-7.
10-15	The ESA status of fish has been corrected in the Final EIS. Benefits to steelhead and bull trout were added to the text.
10-16	Text has been added to the Final EIS regarding the need for improved passage at Clear Lake Dam as part of passage improvements at Tieton Dam.
10-17	The repetitive sentence was deleted in the Final EIS text. A statement was added to the following paragraph that expansion of Bumping Lake Dam would require reevaluation of fish passage facilities. The impacts of enlarging Bumping Lake are described in Section 5.9.2.3.
10-18	The Final EIS text was revised per your suggestion.
10-19	A statement has been added to the Final EIS text to clarify that the amount of habitat on the North Fork would only occur if passage is also provided at Clear Lake Dam.
10-20	The need for habitat improvements in Gold Creek has been added to the text in the Final EIS.
10-21	The Final EIS text has been revised per your suggestion.
10-22	The first change you recommend is included in the No Action Alternative. The second recommended change was added to the Integrated Water Resource Management Alternative. The third change suggested is already part of the Integrated Water Resource Management Alternative insofar as conserved water is available for instream flow uses to be determined by system operators.
10-23	Comment noted. The Enhanced Water Conservation Element includes KRD canal improvements and additional lateral improvements.

10-24	The text has been revised in the Final EIS.
10-25	The section where you suggest changes has been deleted from the Final EIS.
10-26	The changes you recommend have been included in the Final EIS text.
10-27	Table 2-4 has been revised in the Final EIS per your suggestions.
10-28	Comment noted. Reclamation has stated that it is unlikely that any major adjustments to flip-flop would occur without other major structural changes.
10-29	Additional explanation has been provided in the Final EIS for why Ecology is not carrying forward an option to pump directly from the Columbia River. See Section 2.4.4.
10-30	The correct map has been inserted in the Final EIS.
10-31	The use of the ground water basins designated in the USGS study is appropriate in Section 3.1 which describes earth resources. Surface water is discussed in Section 3.3 and other maps are referenced in that section.
10-32	Section 3.2 in the Final EIS has been revised to include the University of Washington's Climate Impacts Groups study of the effect of climate change on water resources in the Yakima basin. The University of Washington study includes more recent climate change data than the USGS study that you cite.
10-33	Information about the need for improved fish passage at Clear Lake Dam has been added to the Final EIS.
10-34	Comment noted. This is also true for a number of other tributaries in the Yakima basin.
10-35	Section 3.3.4.3 describes flow conditions in Taneum Creek. Fish passage is discussed in Section 3.9 which does note the partial passage for fish on Taneum Creek.
10-36	Yakima River flow below the Chandler return is reduced from the unregulated state in summer.
10-37	Section 3.9.1.2 has been revised with additional fish passage barrier information.
10-38	Ecology considered including the map you provided but elected to use a more general map to show fish passage.
10-39	The typographical error has been corrected in the Final EIS.
10-40	Your offer to work with Ecology to improve Section 3.9.1.4 is appreciated. Ecology identified additional sources and has made revisions to the Final EIS text. Ecology does not believe that additional detail is needed in the Affected Environment section to understand the environmental consequences of the proposal. The level of detail provided meets SEPA requirements (WAC 197-11-402(4)).
10-41	Information on Pacific lamprey has been added to Section 3.9.1.3.
10-42	The text of the Final EIS has been modified to further describe bull trout populations in the Naches River basin.
10-43	Figure 2-4 has been revised to account for the previous discrepancy.
10-44	A legend is included at the bottom of the table.
10-45	The sentence has been revised in the Final EIS.
10-46	Additional information has been added regarding the potential abundance of anadromous fish above the reservoirs.
10-47	Additional information has been added to Table 5-18 in the Final EIS.
10-48	This correction has been made to the Final EIS.
10-49	Additional information has been added to Table C-1 in the Final EIS. See the response to your Comment 10-40 regarding Tables C-3 through C-6.

January 16, 2009

Derek I. Sandison
Central Regional Director
Washington State Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

Via email: dsan461@ecy.wa.gov

Dear Mr. Sandison:

11-1 Thank you for this opportunity to comment on the Draft Supplemental Environmental Impact Statement (DSEIS) for the Yakima River Basin Water Storage Feasibility Study. This DSEIS represents significant progress toward developing a comprehensive strategy for restoring the Yakima River and many of its tributaries in a way that can help rebuild salmon and steelhead populations, improve general river health and function, and improve certainty for the Yakima Basin's out-of-stream water users. We look forward to working with the Department of Ecology and a range of stakeholders in the Yakima Basin to help identify the most environmentally beneficial and cost-effective combination of actions to accomplish the study's objectives.

American Rivers is a national, non-profit conservation organization dedicated to protecting and restoring healthy natural rivers and the variety of life they sustain for people, fish, and wildlife. We have a growing national network of members and supporters totaling over 65,000 people. American Rivers' Northwest office serves over 2,000 members in Washington, Oregon, and Idaho.

I. General comments

11-2 In the wake of the Final Feasibility Study/Environmental Impact Study by the Bureau of Reclamation focusing primarily on the Black Rock dam proposal, it is a welcome turn of events to be able to review a document that examines a broad range of potential opportunities for habitat, water supply/instream flow, and fish passage improvements.

We are encouraged that Ecology is considering using the information obtained through the state's SEIS process to work with the federal Bureau of Reclamation to help inform a third phase of the Yakima River Basin Water Enhancement Program (YRBWEP). To help ensure thoughtful analysis of the various options under consideration, and to

11-2 facilitate a strong package of flow, fish, and water supply improvements that merits widespread political support, we encourage Ecology to form a YRBWEP III stakeholder advisory body similar to the Policy Advisory Group for Ecology's Columbia River Water Management Program.

II. Comments on the various potential elements of the Integrated Water Resource Management proposal

11-3 For each of the elements of the Integrated Water Resource Management (IWRM) proposal, it would be helpful to see the final SEIS break down and quantify, to the extent that it is technically possible, the anticipated biological and/or water supply (instream and out-of-stream) benefits of each major project and various combinations of projects. In the final SEIS it will be helpful to see the "State Alternatives" that were analyzed in the January 2008 draft federal-state EIS included and analyzed in combination with various IWRM elements.

a. Fish passage

11-4 American Rivers strongly supports further analysis and consideration of adding fish passage at the five dams discussed in the DSEIS. The benefits of restoring access to historic habitat for reintroduced sockeye and other anadromous fish species would clearly be significant both for the environment and for future fishing opportunities. While the Bureau of Reclamation's fish passage EIS addresses fish passage configuration issues at some of the proposed sites, it would be helpful for the final SEIS to include a more thorough explanation of the feasibility, cost, and biological pros and cons of pursuing volitional adult passage at the various sites.

b. Structural or operational changes to existing facilities

11-5 American Rivers supports Ecology's analysis of these projects as part of the IWRM concept. One alternative we would like to see addressed in the final SEIS is whether, in combination with other projects explored in this SEIS, it might be feasible to provide irrigation water currently diverted by Roza Dam another way, which might allow for the dam's removal.

c. New or expanded storage reservoirs

11-6 In analyzing the potential flow and out-of-stream water supply benefits of new or expanded storage reservoirs, significant scrutiny must be applied given the generally significant environmental impact and high cost of these kinds of projects. Before any decision to build a new dam and/or expand an existing reservoir, a comprehensive analysis must show that vital in- and out-of-stream needs can only be met with a new dam and/or expanded reservoir and not with other less expensive or less damaging alternatives, which must receive detailed consideration. Beneficiaries of any new dam and/or expanded reservoir should also be required to pay an equitable share of construction and operating costs.

11-6 The final SEIS should clearly show what kind of biological and flow benefits can be secured with and without the new or expanded storage category included as part of the IWRM strategy. It should also lay out what proportion of any new water storage would be used to benefit instream flow for fish and what portion would go to other uses.

More specifically, and as the DSEIS acknowledges to some extent, the Bumping Lake expansion – which appears to require a new large dam – would almost certainly be very controversial and generate significant opposition due to its impact on the surrounding wilderness area and forest.

d. Fish habitat enhancements

11-7 We strongly support the fish habitat enhancement element of the IWRM proposal. Reconnecting off-channel habitat, restoring floodplains, and other habitat improvements holds significant potential for improving fish survival and productivity in the Yakima Basin. We look forward to the final SEIS examining the fish restoration potential of these projects both on their own and in combination with other actions proposed as part of the IWRM.

e. "State Alternatives" in federal/state EIS

11-8 As noted above, we strongly support Ecology's stated intention to include the "State Alternatives" from the January 2008 draft federal/state EIS in its final SEIS. It will be very helpful to informed decision making to see how those alternatives interact with various projects and categories of projects contemplated in the IWRM proposal. In particular, we are interested to see what conservation, groundwater storage, and market-based reallocation of water resources can accomplish for in- and out-of-stream water supply and salmon and steelhead survival and productivity in combination with various combinations of actions explored as part of the IWRM analysis.

Thank you for your consideration of these comments and please let me know if you have any questions.

Sincerely,

Michael D. Garrity
Washington Conservation Director

Comment Letter No. 11 – American Rivers – Michael Garrity

11-1	Comment noted.
11-2	Comment noted. Ecology and Reclamation have begun to develop an implementation plan for the Integrated Water Resource Management Alternative. As part of that process they are establishing a Work Group to provide advice on the process. American Rivers has been invited to participate in the Work Group.
11-3	The Final EIS includes some additional quantification of the benefits of the elements of the Integrated Water Resource Management Alternative; however, the EIS analysis is still at a programmatic level. Additional detail will be provided during project-level analysis of any elements carried forward. The Final EIS does include the State Alternatives from the January 2008 Draft Planning Report/EIS.
11-4	Additional analysis of the fish passage facilities is not included in this Final EIS because the document is still at a programmatic level. However, Reclamation and Ecology are working jointly on a separate NEPA/SEPA EIS to evaluate fish passage facilities and fish reintroduction at Cle Elum Dam.
11-5	This is not part of the Integrated Water Resource Management Alternative at this time, but may be possible with the Wymer reservoir project and one of the fill routes described in the Final EIS. Note that Roza Dam also diverts water for hydropower and that power production would need to be replaced if Roza Dam were removed.
11-6	Ecology has conducted modeling of the potential for water storage in the Naches River basin using Bumping Lake expansion as a proxy for a storage facility. The modeling indicates the amount of water that would be available for water supply and for instream flow for fish. Ecology assumes that irrigation districts benefitting from additional storage would pay their share of the cost of construction and operation. Roza Irrigation District has indicated their willingness to do this for expansion of Bumping Lake.
11-7	Comment noted. The Final EIS includes some additional analysis of the benefits of fish habitat enhancement; however, additional, project-level analysis will be required when this element is carried forward.
11-8	As noted in response to your Comment 11-3, the State Alternatives from the January 2008 Draft Planning Report/EIS have been incorporated in this Final EIS. The State Alternatives have been included in the evaluation of the potential benefits of elements of the Integrated Water Resource Management Alternative.

-----Original Message-----
From: John Osborn [mailto:John@WaterPlanet.ws]
Sent: Friday, January 16, 2009 7:54 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

Derek I. Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

January 16, 2009

Dear Mr. Sandison,

Thank you for the opportunity to comment on the Supplemental Draft Environmental Impact Statement - Yakima River Basin Water Storage Feasibility Study. Please accept these comments on behalf of the Center for Environmental Law & Policy (CELP).

12-1

Many people and organizations in Washington State are deeply concerned about the adverse impacts of the state's water program and oppose the construction of new dams and reservoirs in areas that include wildlife and fisheries habitat and family farms and ranches.

Despite decades in which water conservation irrigation measures should have been carried out, the Department of Ecology persists in resurrecting previously rejected storage sites in the Yakima River basin, such as the
12-2 Bumping Lake Enlargement (Wm. O Douglas Wilderness Area)and Wymer Dam.

Each of these dam and reservoir projects threatens habitat and/or water quality. Each is exorbitantly expensive, unneeded in view of alternative water supply options, and represents significant waste of taxpayer funds.

12-3 In the face of climate change and set against a history of overallocating water (that continues today), the state faces a water crisis.

For Washington State, the water frontier is over.

The state's water future rests with an end to giving away more water -- coupled with aggressive water conservation, adoption of water efficiency standards and metering, water markets, low-impact storage projects (e.g., aquifer storage and recovery), natural storage through forest and flood-plain protection and restoration and other techniques that are much more
12-4 cost-effective than new dams, and could vastly improve the efficiency of water use in the Yakima Basin.

We strongly urge Washington State to focus on future water projects that fix existing problems, not cause new ones. We recommend that Ecology fully redirect its staff and resources to water solutions that are sensible, sustainable, and affordable.

Again, thank you for the opportunity to comment.

Sincerely,

John Osborn, MD
CELP

Comment Letter No. 12 – Center for Environmental Law and Policy – John Osborn

12-1	Comment noted.
12-2	Comment noted.
12-3	Comment noted. The Final EIS includes additional information about the impacts of climate change in the Yakima River basin and how the elements of the Integrated Water Resource Management Alternative will increase adaptability to those impacts.
12-4	Comment noted. The Integrated Water Resource Management Alternative includes most of the elements you suggest, including enhanced water conservation, water markets, ground water storage, and floodplain protection and restoration. Ecology is pursuing water metering through a separate process. Ecology is actively promoting these methods to improve water allocation, but also believes that additional storage is needed to meet water needs in the Yakima River basin.

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JAN 20 2009
DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Naturam Expellas Furca *Tamen Usque Recurret*

WISE USE MOVEMENT

P.O. Box 17804, Seattle, WA 98127

January 15, 2009

TO: Derek Sandison
Department of Ecology
15 West Yakima Ave. Suite 200
Yakima, WA 98902-3452
dsan461@ecy.wa.gov

RE: *Yakima River Basin Water Storage Feasibility Study Supplemental Draft EIS*

Dear Department of Ecology:

We have reviewed a copy of the *Yakima River Basin Water Storage Feasibility Study Supplemental Draft EIS (SDEIS).* The following are the comments of the Wise Use Movement.

GENERAL COMMENTS

13-1 Overall, we are concerned that Ecology has ignored the scoping comments that the WUM submitted in July of 2008. Our scoping comments provided specific areas of concern and requests for additional information. A review of the SDEIS Appendix A "Summary of Scoping Comments" shows that Ecology has failed to address or even list many of the scoping comments submitted by the WUM. Therefore, we incorporate by reference, as comments on the SDEIS, our scoping comments and request that the SFEIS address these comments as well.

13-2 We are extremely disappointed that Governor Gregoire and the Department of Ecology (Ecology) have sent millions of dollars on studying additional irrigation dam projects in the Yakima Basin, including the Bumping Lake Enlargement, Wymer, and the Black Rock Reservoir. Despite the fact that the Bureau of Reclamation (BuRec) has rejected these three projects, Ecology persists in wasting even more money studying further the Bumping Lake Enlargement and Wymer projects.

13-3 The Bureau of Reclamation (BuRec) has just issued a "Final Planning Report/Environmental Impact Statement Yakima River Basin, Water Storage Feasibility Study," (BuRec FPR/EIS) dated December 2008. The BuRec looked at four alternatives, 1) No Action; 2) Black Rock; 3) Wymer Dam and Reservoir, and 4) Wymer Dam Plus Yakima River Pump Exchange. According to the BuRec FPR/EIS, pages 2-127 to 2-128, the BuRec selected the no action alternative as the preferred alternative because the other alternatives:
-- Required significant investment of federal funds ($1 billion to $7.7 billion) plus millions of dollars in annual operating costs;
-- Did not provide positive benefit-cost ratios required to be considered economically justified;
-- Did not have acceptability by the community at large as a stand-alone approach to meeting the Storage Study goals, and
-- Did not adequately meet the four criteria, completeness, effectiveness, efficiency, and acceptability, used to evaluate federal water resource projects.

These are the same general conclusions that cover the additional irrigation dam projects (Bumping Lake enlargement, Wymer reservoir and the Pine Hollow reservoir) presented by Ecology in the SDEIS. It is instructive to quote directly from the BurRec FPR/EIS's conclusions in Section 2.10.1, pages 2-128 to 2-131 regarding why the BurRec rejected the Bumping Lake Enlargement Alternative from further consideration:

> "Enlarging Bumping Lake has been proposed at various times by Reclamation and others in the Yakima River basin since the 1950s. The proposal for Bumping Lake Enlargement consists of a new dam approximately 4,500 feet downstream from the existing dam with an enlarged reservoir capacity of approximately 400,000–458,000 acre-feet. The zoned rockfill dam would be approximately 233 feet high with a crest length of about 3,300 feet. The surface area of the enlarged reservoir would be about 4,100 acres. The existing Bumping Lake Dam would be breached. The Bumping Lake enlargement area lies at the end of a two-lane paved road some 12 miles off the Chinook Pass Highway. Goose Prairie is a small community a short distance downstream from the new damsite and would not be inundated.
>
> "In 1979, Reclamation and the U.S. Fish and Wildlife Service prepared a joint feasibility report which was approved by the Secretary of the Interior; and a *Proposed Bumping Lake Enlargement, Final Environmental Impact Statement*, was filed by Reclamation with the Council of Environmental Quality on August 23, 1979 (Reclamation, 1979). Bumping Lake enlargement also was considered as a part of the Yakima River Basin Water Enhancement Project conducted in the 1980s and early 1990s. In the mid-1980s, a 250,000-acre-foot enlargement also was considered. Over the years, several bills have been introduced in the Congress to authorize the construction and operation of the Bumping Lake Enlargement Alternative. However, no action has been taken. This primarily is due to the concerns expressed by the environmental community through
> 13-3 local, State, and national organizations opposed to such action. The following environmental and social issues were raised in previous studies and are still of concern today.
>
> "The William O. Douglas Wilderness Area, approximately 170,000 acres, is adjacent to the existing Bumping Lake. None of the reservoir enlargement options that have been considered were within the Wilderness Area boundary. However, a common concern voiced was that the enlarged reservoir would be visible from various vantage points and detract from the scenic vistas and aesthetic value of the Wilderness Area through reservoir drawdown and exposure
> of the reservoir bottom area.
>
> "About 2,800 acres of terrestrial habitat, including approximately 1,900 acres of old-growth timber, would be inundated if Bumping Lake were enlarged to a capacity of 400,000–458,000 acre-feet. Old-growth timber serves as habitat for the spotted owl, an ESA-listed endangered species.
>
> "Enlarging Bumping Lake would inundate approximately 10 miles of perennial and intermittent stream habitat downstream from the existing dam and upstream of the existing reservoir, affecting the aquatic ecosystem and fishery resources. This is compounded by the recent designation of Deep Creek and Bumping River as critical habitat for bull trout. The larger-capacity reservoir would not fill on a regular basis and would not be a reliable source of water. Previous studies identified approximately 14 summer homes within the impact area of the enlarged reservoir. It was proposed that these summer homes would need to be relocated downstream from the new dam. A number of the owners opposed downstream relocation. The enlarged reservoir also would inundate existing recreational facilities and approximately 9 miles of U.S. Forest Service road, plus approximately 17 miles of road that would be closed, terminating all vehicle traffic above the damsite and road access to campgrounds above the existing reservoir. In addition to the roads, about 4 miles of trails would be inundated. These

13-3 actions would hamper accessibility to areas above the reservoir. Increased traffic associated with construction activities at the new dam, including logging of the enlarged reservoir area, would have an adverse impact on the community of Goose Prairie. Further, increased recreation use at an enlarged reservoir also could adversely affect the community. While the concept of a natural (unregulated) hydrograph was not a primary issue in the past, it has become a significant concern in recent years. Representatives of the Washington Department of Fish and Wildlife and others expressed considerable reluctance at the spring 2007 Storage Study Roundtable discussions to include an enlarged Bumping Lake as a storage alternative to be carried into the planning report and environmental impact statement phase of the Storage Study.

. . .

"The amount of additional stored water available in average water years does not represent a meaningful amount to exchange with the three reservoirs in the upper Yakima River basin to warrant further consideration of this alternative. Because of the reasons stated above, Reclamation has concluded that the proposal for Bumping Lake Enlargement Alternative will be eliminated from further consideration in the Storage Study."

13-4 It is particularly disturbing that Ecology has failed to disclose the obvious environmental impacts and economic failures of the Bumping Lake Enlargement proposal as part of its DSEIS.

More specific comments are as follows:

13-5 **Chapter 1.0**
Sec. 1.1, page 1-1. This section states: "The Washington State Department of Ecology (Ecology) is facilitating the development of a program for an integrated approach to improve habitat for anadromous and resident fish and water supply for irrigated agriculture and future municipal water needs in the Yakima River basin (Figure 1-1). . . In January 2008, Ecology and the U.S. Bureau of Reclamation (Reclamation) released a Draft Planning Report/Environmental Impact Statement (EIS) for the Yakima River Basin Water Storage Feasibility Study that evaluated opportunities for water storage in the basin. Ecology and Reclamation received comments on the document stating that it had not considered a sufficiently wide range of alternatives and that the alternatives should include an integrated approach to benefit all resources and that includes fish passage and habitat improvements in addition to improved storage. In this Supplemental Draft EIS, Ecology presents an alternative that proposes additional storage options integrated with fish habitat and passage improvements. This alternative is named the 'Integrated Water Resource Management Alternative.'"

Comment: Ecology and the Bureau of Reclamation released a draft EIS in January 2008 that rejected the misguided dam storage projects that have been proposed by eastern Washington irrigators for decades. Rather than heeding these findings, Ecology claims that further alternatives should be evaluated to provide "an integrated approach." However, Ecology has continued to waste taxpayers money by evaluating "additional storage options" that were previously rejected as uneconomical. The alternative presented in this Supplemental Draft EIS should be named the "Ecology Tax Dollar Wasting Alternative."

13-6 **Sec. 1.2, page 1-5.** This section selectively lists factors contributing to water resource problems.

Comment: The following additional factors should be listed:

* Irrigation water and energy for pumping have been subsidized resulting in incorrect economic signals regarding irrigated agriculture.

* Irrigation districts continue to grow surplus or non-food crops.

* Irrigation withdrawals have resulted in the extinction of several anadromous fish species.

* Clearcutting, road construction and other forestry practices on National Forest, state DNR forests, and private timberlands have altered spring runoff to the detriment of instream flows.

* Drought years result in prorationing of water to junior water users under provisions of a 1945 court order to the detriment of instream flows (see Section 1.6.3 of the January 2008 Draft Planning Report/EIS).

13-6 It also states, "Water rights in most of the basin are fully appropriated, making it difficult to acquire water rights to meet future municipal and domestic water demand".

Comment: Please delete this and replace with:

* Water rights in most of the basin are over appropriated, making it difficult to acquire water rights to meet future municipal and domestic water demand and instream flows.

13-7 **Sec. 1.3.1, page 1-6.** It states, "Approximately 450,000 acres are currently irrigated from the Yakima Project (Figure 1-2). This irrigation has enabled the production of high value orchard crops, wine grapes, and hops in addition to grains, vegetables, and dairy products."

Comment: Please provide a more detailed analysis which includes:

- the number of acres and types of crops under irrigation using drip irrigation
- the number of acres and types of crops under irrigation producing USDA defined surplus crops
- the number of acres and types of crops under irrigation producing crops for export
- the number of acres and types of crops grown under water spreading (irrigation of crops on acreage outside of designated irrigation district boundaries)

13-8 **Sec. 1.3.2, page 1-10.** It states, "In response to increased interest in finding nonstorage solutions to water management issues in the basin, Congress authorized Phase II of YRBWEP in 1994. Actions that have been undertaken as part of Phase II include a voluntary water conservation program and the establishment of target flows on the Yakima River."

Comment: How much acre feet of water has been used to enhance in-stream flows in the Yakima Basin since 1994 under the "voluntary water conservation program?" Please identify all target flows and an analysis of the success in meeting these target flows on the Yakima River.

13-9 It states, "Under state legislation, the Yakima River Basin Watershed Planning Unit developed a watershed plan in 2003."

Comment: Did this watershed plan review forest practices in the Yakima River watershed? What impacts has logging in the Yakima River Basin had on Yakima River in-stream flows?

13-10 **Sec. 1.3.3, page 1-10.** It states, "Yakima/Klickitat Fish Program hatchery program have all contributed to improvements in spring Chinook abundance and reintroduction of coho in the basin."

Comment: Please provide an analysis and quantify how the Yakima/Klickitat hatchery program has contributed to these improvements.

13-11 **page 1-11.** It states, "In spite of the significant past efforts, there are still many more unscreened irrigation diversions. . ."

Comment: Why are irrigation diversions still unscreened despite the passage by Congress in 1979 of the Yakima River Basin Enhancement Project, thirty years ago, which was designed to address the problem? Please identify all remaining unscreened irrigation diversions.

13-12 **Chapter 2.0**
Sec. 2.2 Alternative 1 – No Action, pages 2-1 to 2-6.

13-12 **Comment:** What are the quantifiable improvements that have taken place in the Yakima River Basin in the past 20 years for each of the storage modification, supplementation, and fish enhancement projects described in Sections 2.2.1 to 2.2.10? Without this information, the no action alternative can not be properly evaluated.

13-13 **Sec. 2.3.2 Bumping Lake, pages 2-15 to 2-16.**

Comment: This section states: "Prior to construction, there were anadromous runs of spring Chinook, steelhead, sockeye and coho upstream of where the dam is presently located. Currently, the Bumping River supports anadromous spring Chinook and steelhead below the dam, and bull trout above the dam."

The Wise Use Movement proposes that Ecology include, as part of the Supplemental EIS, an alternative that removes the existing Bumping Lake dam, enlarges the William O. Douglas Wilderness Area to protect as much of the Bumping River as qualifies for wilderness designation, and establishes a watershed anadromous fish recovery area.

13-14 **Sec. 2.3.4 New Storage Element, pages 2-20 to 2-31.**
page 2-25 Bumping Lake Enlargement

Comment: The Wise Use Movement is opposed to further construction of additional storage projects in the Yakima River Basin, including, but not limited to the sites listed in Table 2-2 on pages 2-34 to 2-35. In particular, we support the decision of the Bureau of Reclamation not to carry forward the Bumping Lake enlargement in its Water Storage Feasibility Study because of the flow impacts and other potential environmental impacts. We request that the BurRec FPR/EIS's conclusions in Section 2.10.1, pages 2-128 to 2-131 on the Bumping Lake enlargement as quoted in the General Comments above be included in this section in the FSEIS.

13-15 **Chapter 3.0**
Sec. 3.8.1.3, pages 3-42 to 3-43. Bumping Lake.

Comment: On pages 3-42, 3-43, the SEIS notes that Bumping Lake is in a spotted owl Critical Habitat Unit (CHU) Number 6, but does not mention the presence of any old growth. Please identify and locate all old growth between the existing Bumping Lake shoreline and the existing William O. Douglas Wilderness. How much spotted owl habitat would be eliminated by the two proposed Bumping Lake enlargement projects?

13-16 **Chapter 5.0**
Sec. 5.3.2.3 Bumping Lake Expansion, pages 5-11 to 5-21.

Comment: The Wise Use Movement objects to the construction of a Bumping Lake Expansion. This project has been a perennial loser. For both the large and small option:

* How can any Bumping Lake expansion storage be allocated to in-stream flows, when any increased water storage would be required to supplement junior irrigation districts during drought years under the 1945 Federal Court Consent Decree?

* On page 5-17 it states, "Using the assumptions developed to determine the amount of water available for storage, it would take six to seven years on average to completely refill Bumping Lake under the large option if the lake was empty when refilling began. It would take three consecutive wet years (similar to 1995-1997) to completely refill." Notwithstanding legal restrictions to the use of storage water for in-stream flows, how would storage be available for in-stream flows during a drought period when it is most needed, given the extremely long number of years needed for refilling the reservoir? How has storage evaporation been calculated into the storage capacity?

13-17 **Sec. 5.4.2.3, pages 5-37 to 5-39.** This section sets out an extremely limited summary of the impacts on existing water rights from various new dam storage projects. It states: "Reclamation's water rights, including those for storage, were confirmed by the Adjudication Court on March 12, 2007."

Comment: How has the Adjudication Court complied with or overruled the 1945 Federal Court Consent Decree, which allocated the existing water supply between the senior and junior irrigation districts in the Yakima Basin? How can "new storage" in the Yakima Basin be allocated to in-stream flows when senior irrigation districts retain a priority in water allocation during drought years?

CONCLUSION

13-18 **In summary, the Wise Use Movement is opposed to all the proposed irrigation dam storage projects presented by Ecology. We remain disappointed that Ecology has failed to aggressively promote water conservation or to provide instream flows for anadromous fish species that were first in time and should be first in right. We are disappointed that Ecology persists in spending millions of dollars on irrigation dam project studies, rather than invest in water conservation and in-stream flows.**

Please provide a detailed response to the comments presented above and provide a copy of the Final Supplemental EIS when it becomes available.

Sincerely

John (Jack) de Yonge
President
Wise Use Movement

Comment Letter No. 13 – Wise Use Movement – John de Yonge

13-1	Ecology reviewed and considered the scoping comments that you submitted. As noted in the Summary of Scoping Comments (Appendix A), the comments you submitted requested detailed analysis that is more appropriate for a project- or construction-level EIS. The Supplemental Draft EIS and this Final EIS are programmatic in nature. Additional analysis will be conducted on individual projects as they are carried forward. See the Master Response for additional information regarding a programmatic EIS. Ecology considered your comments in determining which elements of the environment should be evaluated in this EIS.
13-2	Comment noted. Ecology included Wymer reservoir and the expansion of Bumping Lake as possible elements of the Integrated Water Resource Management Alternative using different operating conditions than Reclamation proposed. Ecology determined that the operating conditions used by Reclamation to determine the feasibility of the two reservoirs did not meet the needs of water users. For Bumping Lake, Ecology has used different instream flows for fish. For Wymer reservoir, Ecology has evaluated different options for filling the reservoir. In addition, the expansion of Bumping Lake was included at the request of the Yakama Nation and Roza Irrigation District and as a proxy in order to model the feasibility of additional storage in the Naches River basin. See the response to Comment 9-3.
13-3	Comment noted.
13-4	Ecology has disclosed the probable environmental impacts associated with expanding Bumping Lake in Chapter 5 of this Final EIS. The evaluation was conducted at a programmatic level as noted in response to your Comment 13-1 and in the Master Response. Additional environmental review would be conducted if the Bumping Lake expansion is carried forward.
13-5	Comment noted. See the responses to your Comments 13-2 and 13-3 and Comment 12-4 regarding the inclusion of storage projects in the Integrated Water Resource Management Alternative.
13-6	Comment noted. Ecology has focused its Integrated Water Resource Management Alternative on problems in the Yakima River basin that are within its control. Therefore, your other suggested problems were not included in Chapter 1. Ecology agrees that fully appropriated water rights have affected the ability to meet instream flows in the basin and has noted that in other bullets in Section 1.2. The 11th bullet in Section 1.2 is intended to address municipal supply problems; therefore, we did not add instream flows per your request.
13-7	The information you request is outside the scope of this programmatic EIS evaluation and has not been included.
13-8	Under YRBWEP, target flows have been established for the mainstem Yakima River at Sunnyside and Prosser Diversion Dams. The target flows are calculated based on the available water supply between April and September and range from 300 to 600 cfs. The target flows are designed to increase as the conservation program is implemented. In addition, Reclamation, in consultation with the Systems Operating Advisory Committee, establishes operational target flows during other months to benefit fish in the basin.

13-9	The Yakima River Basin Watershed Plan did not specifically quantify the impact of logging practices on instream flows; however, it does discuss the habitat impacts of logging and it includes a discussion of instream flows. The document can be reviewed at http://www.yakimacounty.us/ybwra/Watershed/watershedplan.htm.
13-10	Additional information on the fish hatchery program is provided in Sections 2.2.5 and in Section 3.9 of the EIS.
13-11	The remaining unscreened diversions are located on tributaries, and the water users are not part of the Yakima Project and therefore are not under the authority of YRBWEP.
13-12	The No Action Alternative serves as a baseline for evaluating impacts of proposed alternatives. SEPA does not require that the past improvements that have occurred under the No Action Alternative be evaluated to provide a baseline. Essentially the No Action Alternative defines what the existing conditions are. A description of existing conditions in the Yakima River basin is provided in Chapter 3. The benefits and impacts of the proposed alternatives are then compared to existing conditions in Chapters 4 and 5.
13-13	The removal of Bumping Lake Dam and expansion of the William O. Douglas Wilderness are outside the authority of Ecology and are not included in this EIS. The Integrated Water Resource Management Alternative does include establishing fish passage at Bumping Lake Dam and fish habitat restoration above the dam.
13-14	Your comment in opposition to storage reservoirs is noted. See the responses to your Comment 13-2 and Comment 9-2 regarding Bumping Lake expansion. Because Reclamation's proposed operating procedures for an enlarged Bumping Lake are different than Ecology's, specific conclusions from Reclamation's Final Planning Report/EIS are not relevant to this study; however, the Final EIS does include a discussion of Reclamation's study.
13-15	See the response to your Comment 13-1 regarding the programmatic nature of this EIS. Analyses such as you request for the amount of old-growth forest surrounding Bumping Lake would be conducted during a project-level environmental analysis if the Bumping Lake expansion is carried forward.
13-16	We are not aware of a requirement that additional storage be allocated solely to proratable water users during drought periods. The parties to the Consent Decree were Reclamation and the irrigation districts. Paragraph 20 of the Consent Decree reads in part: "The rights of any claimants to water of the Yakima River or watershed who are not parties to this case shall in no way be prejudiced or affected by this judgment[.]" The Yakama Nation was not a party to the Consent Decree. A Federal Court order in 1980 required Reclamation to make releases from Yakima Project reservoirs to assure adequate instream flows for fish spawning and rearing. In its July 16, 1996 Order Re: Motion to Limit Treaty Water for Fish, the Yakima Adjudication court held: "Pursuant to previous orders of this Court and the Ninth Circuit in Kittitas v. Sunnyside (Civil 21), the Bureau of Reclamation shall release or otherwise provide water from TWSA or other source"... "to satisfy the Yakama Nation's Treaty-reserved water right for fish." Ecology and Reclamation have conducted hydrologic modeling of water availability in the Naches River basin which is summarized in the Final EIS.

13-17	The Adjudication Court has not overruled the 1945 Consent Decree but has followed the ruling of the state Supreme Court in an appeal of the water rights of the Yakima-Tieton Irrigation District. The Supreme Court held that "[t]he 'allocation' of water in the 1945 Consent Decree and water delivery contracts resulted from a settlement agreement between the parties. That agreement may be binding as to the respective rights and priorities amongst the parties" but it did not in and of itself create any state-based water rights. *Ecology v. Acquavella*, 131 Wn.2d 746, 757, 935 P.2d 595 (1997). Any new storage would have a priority date of February 17, 1981. In low water years, water would be allocated based on priority date. The goal of increased storage is for more total water to be available to users during low water years.
13-18	Your comments in opposition of water storage projects are noted. Ecology has included enhanced conservation and providing instream flows for fish in the Integrated Water Resource Management Alternative presented in this EIS. Your name has been added to the distribution list for this project and you will receive a copy of the Final EIS with this detailed response to your comments.

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CASCADE CHAPTER
180 Nickerson St., Suite 202
Seattle, WA 98109
January 15, 2009

Derek I. Sandison
Central Regional Director
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

RE: *Supplemental Draft Environmental Impact Statement Yakima River Basin Water Storage Feasibility Study*

Dear Mr. Sandison:

On behalf of the 30,000 members of the Cascade Chapter of the Sierra Club, I would like to offer comments on the above Supplemental Draft EIS (DSEIS).

14-1 We oppose any new storage projects on the Yakima River and its tributaries, including the Bumping Dam Enlargement (Large or Small Options), Wymer Dam (on Lmuma Creek), and Black Rock Dam. DOE and Bureau of Reclamation (BuRec) identified numerous possible measures for improved water conservation, including measures in the No Action Alternative and the Enhanced Water Conservation Alternative of the January 2008 *Yakima River Basin Water Storage Feasibility Study Draft Planning Report/Environmental Impact Statement* (Draft Report). The conservation measures of one of these alternatives should be implemented before there is any further study or action on new storage projects.

14-2 We specifically oppose any alternatives that would raise Bumping Dam and enlarge Bumping Lake, including the new Integrated Water Resource Management Alternative. We are disturbed that this alternative continues to rely on an expanded Bumping Lake. BuRec has already determined that it would not further study a Bumping Lake Enlargement project. DOE should realize that the net gains from expanding Bumping Lake storage are far outweighed by the many harmful impacts, and that mitigation of the impacts is extremely expensive or impossible. In particular, we feel that the loss of over 1900 acres of irreplaceable old growth forest around the current Bumping Lake (and substantially more under the Large Option of the Bumping Lake

14-2 Expansion) is completely unacceptable. (Draft Report p. 2-109) 14-3 The other forest types that would also be inundated provide a contiguous forest canopy used by numerous late-successional forest species that have been given protection in the U.S. Forest Service's 1994 Northwest Forest Plan. Indeed, the entire area surrounding Bumping Lake, up to the W.O. Douglas Wilderness boundary, has been protected by the Forest Service as a Late-Successional Reserve, which protects the forest from most forms of logging and road construction.

14-4 The Jan. 2008 Draft Report summarizes numerous additional impacts to public recreation, trail access, home sites, visual quality, and other public resources. (Draft Report pp. 2-109, -110, plus DSEIS p. 4-25) Unfortunately the DSEIS fails to extend this impact analysis to the larger reservoir and higher dam of the "Large Option" of the Integrated Water Resource Management Alternative. We support BuRec's conclusion in the Draft Report to eliminate the Bumping Lake Enlargement Alternative from further study.

14-5 The Bumping Lake Enlargement Alternative studied in the Jan. 2008 Draft Report provides up to 63,000 acre-feet additional supply during drought years (e.g. Draft Report p. xxvii). The additional storage capacity for the Large Option indicated in the DSEIS (e.g. p. 5-11) is speculative: it would take many years of average precipitation to fill the larger reservoir (the DSEIS admits 6-7 "average" or three "wet years." (DSEIS p. 5-17) However, the full capacity of the lake cannot be drained in one season without compromising downstream water availability in future years. In the big picture, the Bumping River flows are far, far below the flows of all the other rivers in the Yakima River system; it is too much to ask to make Bumping Lake handle flows comparable to the larger reservoirs when it is physically impossible to get such flows from the much smaller watershed that drains into Bumping Lake.

14-6 The full scope of impacts to terrestrial forest habitat is not disclosed in the DSEIS. For example, the Bumping Lake portion of the Vegetation and Wildlife section (DSEIS pp. 3-42, -43) does not disclose that much of the forest habitat that would be inundated by an expanded Bumping Lake is old growth forest several hundred years old, as well as additional mature forest, and that all of this forest habitat is currently protected under the Northwest Forest Plan. The DSEIS contains no maps of old growth and mature forests to indicate the extent of harm that inundation would create. For example, a grove of very old trees, each several feet in diameter, is located just a few yards from the current lakeshore and would be inundated by almost any dam enlargement, as would the adjacent hiking trail. Similarly, mention is made of bull trout above
14-7 the dam, but no maps of bull trout distribution are presented, nor does the DSEIS reveal the actual amount of bull trout habitat (e.g. stream miles) that would be impacted by the proposal.

14-8 The DSEIS also lacks a great deal of quantitative information about terrestrial forest impacts. For example, the discussion of the removal of old growth forests for the construction of fish passage facilities at Bumping Dam mentions "permanent loss of a small stand of trees and riparian vegetation. This would cause minimal impacts to wildlife because the area of impact is small and adjacent suitable habitat is available." What does DOE define as "small"? A tenth of an acre? Ten acres? A thousand acres? "Small" impacts may be substantial for local endemic species but not important for species with wide distributions. Only when the actual acreage and character of impacts is disclosed can the public understand the impacts to terrestrial species. To be credible, the DSEIS analysis must disclose actual quantifiable impacts, not merely have

general statements that can be interpreted differently by different readers. Also, to properly
14-8 provide for long-term mitigation, an EIS must disclose the amount and character of each habitat type that is impacted by the project.

While the original Jan. 2008 Draft Report did quantify the acreage of old growth forest that would be inundated, the DSEIS does not disclose the substantially larger acreage of old growth forest that the Large Option for the Bumping Lake Expansion would inundate. In addition to being required for full disclosure of environmental impacts under both SEPA and NEPA, information on the acreage and character of the old growth to be lost also is essential to provide for full long-term mitigation of the expanded reservoir's impacts. Federal regulatory agencies have required substantial mitigation of the long-term impacts of dams and reservoirs throughout the Northwest. For example, Seattle City Light performed an exhaustive analysis of the original
14-9 habitats inundated by the Skagit River projects in order to develop a comprehensive terrestrial habitat mitigation plan.

The DSEIS should have disclosed the options for long-term terrestrial habitat mitigation. Even if the impact is "only" 1900 acres of old growth (from Draft Report), that would require DOE and/or BuRec to locate and purchase a comparable amount and quality of old growth forest elsewhere in eastern Washington. We know of no comparable contiguous intact stand of lower-elevation privately-owned old growth forest anywhere in eastern Washington—all such stands have been logged by private owners. So the agencies would face an extremely difficult challenge to locate suitable mitigation properties. Purchase of such a large acreage of high-quality old growth forest would cost tens of millions of dollars at current prices. None of these considerations for long-term mitigation have been disclosed in the DSEIS.

We request that the Supplemental EIS also evaluate and compare forestry practices in the Yakima River Basin on private, state and National Forest lands. This evaluation would include an analysis of the existing acreage of clearcuts and commercial thins in the Yakima River
14-10 watershed, as well as the estimated timber harvest acreage for the next decade. Natural forests (such as those that currently remain in the Bumping Lake basin) have a denser canopy that retains snow pack and extends the time over which water runoff occurs. Roads and logging result in earlier show melt and runoff, and contribute to higher spring flows.

Enhanced water conservation measures could be sufficient to remove the need for **any** water from Bumping Lake. This option has not been explored by DOE or BuRec. We request that a supplemental draft EIS be written that examines the benefits of removing the current Bumping Dam entirely and restoring the reservoir site. To provide mitigation for past impacts of Bumping
14-11 Lake (such mitigation has never been provided to date), the new draft EIS should also assess the benefits of expanding the W.O. Douglas Wilderness down to the shores of the current Bumping Lake. The Elwha River dam removal project on the Olympic Peninsula illustrates what can be done to restore aquatic and terrestrial habitat with minimal impact to downstream beneficial users.

We ask DOE to stop further consideration or study of the Bumping Lake Enlargement
14-12 alternative, as well as the other new dam proposals affecting the Yakima basin. Sierra Club is committed to water supply solutions that involve common-sense water management. We

believe that in the face of climate change, aggressive water conservation, adoption of water efficiency standards and metering, water markets, **low**-impact storage projects (e.g., aquifer storage and recovery), forest and flood-plain restoration, and other strategies to promote natural storage are much more cost-effective than new dams, and could vastly improve the efficiency of water use in Washington State. The historic, massive hydrologic re-engineering of Washington's rivers using dams and irrigation projects has caused historic environmental damage. We strongly urge you to focus on future water projects that fix existing problems, not
14-12 cause new ones.

We respectfully request that DOE get on with such water conservation and fish recovery measures in the Yakima Basin, such as are authorized in the 1979 federal Yakima River Basin Water Enhancement Project (YRBWEP), and spend precious state funds on actual conservation rather than on more studies of very expensive and harmful dam projects. Also, conservation measures can be implemented on much shorter timeframes than can controversial and complex new dam projects. We remain interested and available to work with DOE and BuRec on environmentally sound options to improve water management and availability in the Yakima Basin.

Please direct future correspondence on this matter to:

Mark Lawler, National Forests Committee Chair
Sierra Club Cascade Chapter
Tel.: 206 632-1550 h / 425 707-5142 w
Email: mark.lawler@sierraclub.org

Yours sincerely,

Michael O'Brien, Chair
Sierra Club Cascade Chapter

Comment Letter No. 14 – Sierra Club Cascade Chapter – Michael O'Brien

14-1	Your comments in opposition to storage projects are noted. Enhanced water conservation has been included as an element of the Integrated Water Resource Management Alternative included in this Final EIS. Ecology intends that many conservation measures would be implemented before water storage is developed. However, Ecology does not believe that water conservation alone can provide enough water to meet the needs in the Yakima basin.
14-2	See the responses to Comments 9-2 and 13-2 regarding including of the expansion of Bumping Lake as an alternative. The Integrated Water Resource Management Alternative does not "rely on" expansion of Bumping Lake. Rather, Bumping Lake is included as an example of a potential storage project in the Naches River basin. The information on Bumping Lake has allowed Ecology to model the water availability for a storage project in the Naches basin.
14-3	Expansion of the existing reservoir would occur outside of the William O. Douglas Wilderness Area and would comply with the Northwest Forest Plan requirements for the management of Late-Successional Reserve areas, where applicable. Additional studies, including impacts to surrounding forest, would be undertaken if the Bumping Lake expansion alternative is carried forward.
14-4	The impact of Bumping Lake expansion included in the January 2008 Draft Planning Report and Reclamation's December 2008 Final Planning Report/EIS is for the "large" option of a 458,000 acre-foot reservoir. This is the same size reservoir that was evaluated in the December 2008 Supplemental Draft EIS and this Final EIS. There is no larger option. Limited information is available on the smaller 200,000 acre-foot option and it has not been analyzed in detail in any document. If either option is carried forward, additional analysis would be conducted at the project level. See the Master Response regarding a programmatic EIS.
14-5	See the response to your Comment 14-4 regarding which option is considered the "large" option. Ecology and Reclamation have conducted hydrologic modeling of the large Bumping Lake alternative which is summarized in the Final EIS.
14-6	Impacts to forest habitat caused by inundation are addressed in Section 5.8.2.3. A statement about the amount of habitat that would be inundated under the large option has been added to the Final EIS. A map of existing and impacted habitat types would be required and developed in any project-level NEPA or SEPA evaluation if this option were carried forward in the future. See the Master Response regarding the programmatic nature of this EIS.
14-7	Section 5.9.2.3 indicates that the Bumping River Dam expansion would impact/inundate approximately 10 miles of bull trout habitat.
14-8	Section 5.8.2.1 indicates that the area of trees and riparian vegetation that would be lost for construction of the fish passage facilities, all elements combined (fish ladder, loading slab, conduit, etc.), is 19,600 square feet or about 0.45 acre. Additional analysis of impacts to forests would be conducted in any project-level NEPA or SEPA evaluation if this option is carried forward in the future. See the Master Response regarding the programmatic nature of this EIS.

14-9	See the response to your Comment 14-4 regarding which option is the “large” option. The impacts of the large option were disclosed in both the January 2008 Draft Planning Report/EIS and this EIS. As described in the Master Response regarding the programmatic nature of this EIS, additional evaluation would be conducted under NEPA and/or SEPA when specific alternatives are carried forward in the future. Part of that analysis would be an evaluation of appropriate mitigation measures.
14-10	An evaluation of forestry practices is out of scope for this EIS. Other documents have evaluated forestry impacts. While forestry practices can affect water flows and fish habitat, Ecology does not regulate forest practices and cannot alter those regulations.
14-11	Ecology evaluated enhanced conservation as one of the State Alternatives in the January 2008 Draft Planning Report/EIS. Enhanced conservation has been included as an element of the Integrated Water Resource Management Alternative in this Final EIS. Ecology has supported the removal of dams in some circumstances such as the Elwah Dams and Condit Dam on the White Salmon River. However, Bumping Lake Dam is part of the federally operated Yakima Project and its removal would be outside Ecology’s authority. Bumping Lake provides water to meet long-held water rights claims which could not be easily replaced. Therefore, Ecology is not considering the removal of Bumping Lake Dam. The Integrated Water Resource Management Alternative includes providing fish passage at Bumping Lake Dam and restoring upstream fish habitat. Expanding the William O. Douglas Wilderness Area would require an act of Congress and is outside the authority of Ecology.
14-12	Your comments in opposition to water storage projects are noted. As noted in the response to Comment 12-4, most of the strategies that you recommend Ecology pursue are included in the Integrated Water Resource Management Alternative. Ecology agrees that conservation, fish habitat enhancement, and similar projects can be implemented on a shorter timeframe than new dam projects, and that is why such projects are included as elements of the Integrated Water Resource Management Alternative. See Section S.5 in the Final EIS regarding implementation of the Integrated Water Resource Management Alternative.

National Wildlife Federation
Inspiring Americans to protect wildlife for our children's future

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January 16, 2008

Via Email

Derek I. Sandison
Department of Ecology
15 West Yakima Ave, Suite 200
Yakima, WA 98902-3452

RE: Comments on Supplemental Draft Environmental Impact Statement: Yakima River Basin Water Storage Feasibility Study

Dear Mr. Sandison:

The National Wildlife Federation, Western Natural Resources Center, submits the following comments on the Supplemental Draft Environmental Impact Statement: Yakima River Basin Water Storage Feasibility Study (Yakima SDEIS).

General Comments

15-1

1) NWF strongly supports approach behind the Integrated Water Resources Management Option (IWRMO), but the actual integration needs to go further. Implementing water conservation, efficiency, transfers, management, and storage with ecosystem restoration and mitigation elements in an integrated and optimized manner is the approach that Ecology should take in creating and selecting a final preferred alternative.

15-2

2) Integration of management options requires balancing the benefits and detriments of each element and optimizing the entire package of elements. The IWRMO does not lay out the principles or priorities by which that evaluating, balancing and optimizing is done. To aid in reasonably assessing the potential impacts of any package, Ecology should lay out the principles and priorities it is using in creating the options.

3) NWF suggests that the principles applied in creating the final preferred alternative option:

15-2

a. Environmental restoration and enhancement should be the primary objective of any package of elements assembled. The objective should be restoration, not mitigation for the current projects.
b. Water supply enhancements be limited to improving reliability, and not increasing water availability for new land put into production or switching to more water intensive crops.
c. The principle of "beneficiary pays" be applied to water users – that is, identifiable beneficiaries of water supplies or other benefits pay a pro rata share of the costs associated with the project.
d. A preferred alternative not be selected until completion of a detailed needs assessments that incorporates demand management and full-cost pricing in projections of future demand.
e. The preferred alternative maximizes use of existing water supplies through efficiency, conservation, and reuse of wastewater in both non-potable and potable applications.
f. The costs of the various elements should be compared on a common basis, so that the cost per acre-foot can be compared.

Thanks you for your attention to these comments.

Very truly yorurs,

Steven Malloch
Senior Water Program Manager
National Wildlife Federation

Comment Letter No. 15 – National Wildlife Federation – Steven Malloch

15-1	As described in Chapters 1 and 2 of this EIS, Ecology does intend that the elements of the Integrated Water Resource Management Alternative would be implemented in an integrated manner.
15-2	Your comments are noted. See Section S.5 in the Final EIS regarding implementation of the Integrated Water Resource Management Alternative and the priorities for selecting elements of the alternative.

January 6, 2009

Mr. Derek Sandison, Director
Office of Columbia River
Washington State Department of Ecology
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Dear Mr. Sandison:

Thank you for the opportunity to offer comments on the Washington State Department of Ecology's (Ecology) December 2008 Supplemental Draft Environmental Impact Statement (Supplemental Draft EIS). This document was developed in response to comments previously received on the January 2008 Draft Planning Report/Environmental Impact Statement jointly
16-1 prepared by Ecology and the Bureau of Reclamation (Reclamation) for the Yakima Basin Water Storage Feasibility Study.

Ecology is to be commended for reacting to the views of some of the commenter's on the January 2008 joint document and taking the initiative to consider an alternative which expands the scope of those presented therein. However, the Supplemental Draft EIS is extremely generic and void of the specifics and the evaluations necessary to structure a meaningful and acceptable alternative. Thus, it is very difficult at this time to comment on the merits and accomplishments
16-2 of the consortium of measures that may be included in the Integrated Water Resource Management Alternative.

The comments herein are given in the spirit of striving to reach a consensus on a comprehensive program that fully addresses "the factors contributing to water resource problems in the Yakima
16-3 basin". They also attempt to address some of the primary issues which appear to constrain the capability to move beyond planning to implementation.

The Integrated Water Resource Management Alternative Concept

The purpose of the Supplemental Draft EIS is to evaluate an alternative that provides an integrated approach to resolving water management problems (Chapter 1.2, 2nd paragraph, 1st sentence). The integrated approach is outlined in Chapter 2.1 and is to consist of the following three major actions: (1) additional basin storage and operational changes at existing storage
16-4 facilities to provide a supplemental irrigation water supply in dry years, to meet future municipal water needs, and to improve streamflows in the mainstem rivers and tributaries for enhancement of anadromous and resident fish; (2) fish passage at existing Yakima Project storage dams and at tributary diversions, and (3) improvements in riparian habitat and removal of physical constraints blocking fishery access to side channels and floodplains in the mainstem rivers and the tributaries. Potential elements (or measures) to accomplish these objectives would then be evaluated and selected measures consolidated as a "part of a total package and not as separate

projects to maximize benefits to fisheries while improving water supply"(Chapter 2.31, 2nd paragraph, last sentence).

16-4 You state this will provide synergistic benefits to fisheries. It is important to clarify just how this is going to be "packaged" to obtain the necessary Federal and State authorizations and appropriations, and in its operation and administration.

1. Authorization and Appropriations for Implementation

It appears what you are saying is there will be no effort made to segregate fishery benefits associated with these three major actions. Rather fishery benefits are to be considered as a "composite" resulting from the "total package". If this is the case what are you proposing to use to determine: (1) fishery benefits - - is it monetary benefits based on additional productivity and associated commercial, sport fishery and tribal subsistence harvest values, or some other criteria, and (2) the alternative which maximizes net monetary benefits - - this is generally determined in the Principles and Guidelines by formulating alternatives by means of a National Economic Development (NED) incremental analysis of monetary benefits and costs. If you do not intend to use positive net NED monetary benefits as a major criterion for determining alternative viability how do you anticipate securing Federal authority and appropriations for implementation?

Reclamation's Final Planning Report/Environmental Impact Statement of December
16-5 2008 indicates none of the three joint water supply alternatives are economically justified. Wymer dam and reservoir is one of the water supply alternatives being considered in the Supplemental Draft EIS. It appears the inclusion of monetary benefits associated with major actions (2) and (3) on the previous page must be considered if there is any hope of having positive net monetary benefits of the Integrated Water Resource Management Alternative. This would be applicable to any of the Supplemental Draft EIS storage measures.

The issue is that "on one hand" it appears water supply proposals must pass the "maximum net monetary benefits test" while on the other hand fish passage and habitat improvement proposals appear to be immune to the application of such criteria. Why isn't the matter of net monetary benefits being vigorously addressed at the local, State, and Federal levels so the "full suite" of measures have the opportunity to move forward to implementation? Actions by the State of Washington legislative and executive branches to promote water resource management and development such as the Columbia River Water Management Program appear fruitless unless cooperative local, State, and Federal funding mechanisms and objective and meaningful evaluative criteria are also put in place.

16-6

The July 20, 2008, letter from the Washington Department of Fish and Wildlife in response to scoping comments for the Supplemental Draft EIS included suggestions on calculating anadromous and resident fishery monetary benefits (attachment to their letter, page 3). As a follow-up, it seems desirable to charter a small work group to review and critique current methodology and to recommend a process that truly represents the monetary benefits of the anadromous fishery in the Pacific Northwest.

16-7

2. Operation and Administration

Currently there is no single entity, agency, or organization with the "central focus" and responsibility for implementing water supply, water conservation, fishery enhancement, and other related measures in the Yakima basin. Rather there is a conglomerate of agencies, entities, and organizations, and the Yakama Nation dealing with promoting measures and securing funding for implementation, operation, and administration.

A "central focus" or an "umbrella organization" may be worthy of consideration in conjunction with an Integrated Water Resource Management Alternative. The Yakima Basin Water Resources Agency may come closest to fitting that role. However, the current extent of its activities appears to be the preparation and periodic update of the Detailed Implementation Plan "identifying specific ways that individual agencies and organizations will carry out the proposed actions" of the 2003 Watershed Management Plan prepared under authority of RCW 90.82. This Watershed Management Plan was approved by the County Commissioners of Yakima, Benton, and Klickitat Counties but not by Kittitas County. Further, the Yakama Nation chose not to participate in the process leading up to the development of the Watershed Management Plan nor appears to have provided input to the Detailed Management Plan.

Adoption of the Integrated Water Resource Management Alternative into the Yakima Basin Watershed Management Plan and restructuring, as necessary, the Yakima Basin Water Resources Agency might be an option for consideration.

16-8

State Alternatives in Draft PR/EIS (Chapter 1.5)

Chapter 1.5 indicates the three State Alternatives (enhanced water conservation, market-based reallocation of water resources, and ground water storage) contained in the Draft PR/EIS will be considered in the Supplemental Final EIS as potential elements in an Integrated Water Resources Management Alternative. The enhanced water conservation component included four measures in the Wapato Irrigation Project (WIP) which is operated by the Bureau of Indian Affairs to provide water service to irrigated lands of the Yakama Reservation. WIP is the largest diverter in the Yakima basin diverting in the order of 600,000 acre-feet annually from the Yakima River at Wapato Diversion Dam. Improvements in WIP's main conveyance and delivery systems could significantly enhance the reliability of the facilities, its operations, and instream flows in

16-8

the Wapato reach of the Yakima River which has been identified as a priority reach for fishery enhancement.

Reports have been prepared by Tribal staff and a consultant addressing potential actions involving the need for WIP system rehabilitation to assure its continued operating integrity and to improve its efficiency. A proposed priority action is construction of a Yakima River pumping plant and a pressurized pipe delivery system about 60 miles downstream of Wapato Diversion Dam which would provide water to currently irrigated lands of the Satus Unit in lieu of diversions at Wapato Diversion Dam. This activity (included in the No Action Alternative of the Storage Study) would leave water in the Wapato reach improving instream flows to the new point of diversion.

The Yakama Nation is dedicated to improving anadromous fishery conditions including fish passage at existing Yakima Project storage facilities. As a part of the Integrated Water Resources Management Alternative the Yakama Nation in conjunction with the Bureau of Indian Affairs (and others) should be committed to aggressively pursuing a WIP water system improvement program resulting in delivery efficiencies, improved quality of return flows, and the continued operational integrity of the system necessary to maintain the irrigated agricultural resources of the Reservation.

16-9

Alternative 1—No Action Alternative (Chapter 2.2)

The No Action Alternative as defined in the Supplemental Draft EIS indicates there will be no involvement of Ecology in the development of additional water storage facilities, improvements to fish passage and fish habitat, or to implementation of the three potential State Alternatives of the Draft PR/EIS. It is noted however, that various agencies and entities would continue to undertake individual actions (Chapter 2.2, 1st paragraph). It is further indicated that "Projects that are funded and have a schedule for implementation are considered part of the No Action Alternative. Other projects that have been identified in various planning efforts but are not funded or scheduled for implementation were evaluated for inclusion in the Integrated Water Resource Management Alternative" (Chapter 2.2, 2nd paragraph).

The Supplemental Draft EIS summarizes seven current programs of other agencies and entities in the Yakima basin. Some measures promoted by these agencies have been completed, some measures have been funded and are underway, and some measures are awaiting approval and funding. There are a conglomerate of measures falling within the No Action Alternative designation and others that would fall within the Integrated Water Resource Management Alternative. The primary objective of defining a No Action Alternative or a "most likely future condition without a plan" is for use in evaluating the effects of potential action alternatives. This raises the following questions: (1) is the No Action Alternative to be used in evaluating the accomplishments, monetary benefits, and impacts of the Integrated Water Resource Management

16-9 Alternative, and if so, how is this evaluation to be done, and (2) what specific measures fall into the No Action or the Action category?

16-10

Fish Passage at Existing Storage Facilities (Chapter 2.3.2)

A longstanding concern with providing fishery access at existing Yakima Project storage facilities is the matter of it being "water neutral" and not adversely impacting irrigation water rights, operations, and water supply. While the "Cle Elum and Bumping Lake Dams Fish Passage Facilities Planning Project Draft" of September 2008 states that "Fish passage operations are consistent with other Yakima Project operations and would not impact existing delivery contracts, flood control, or instream requirements" some questions remain regarding the availability of water for fish passage operations particularly in dry years.

Acceptability of fish passage at existing Yakima Project storage facilities will require data explicitly confirming its water neutrality and congressional authorization for construction and operation.

16-11

Modifying Existing Structures and Operational Elements (Chapter 2.3.3)

The impact of diversion dam fish bypasses on the survival of juvenile salmon is reported in the "Aquatic Ecosystem Evaluation for the Yakima River Basin Technical Document" of January 2008 prepared as a part of the Storage Study. Indications are that the severity of bypass-related fishery losses is highest at the lower river diversions (Wapato, Sunnyside, Prosser, and Horn Rapids). This analysis should be considered prior to proposing further studies.

16-12 The proposed measures associated with the Kittitas Reclamation District, Naches-Selah Irrigation District and the Satus Unit of the Wapato Irrigation Project are included in the No Action Alternative of the Storage Study and are anticipated to be funded in part and implemented under the authority provided of Title XII as part of Phase II.

16-13

Naches River Storage Reservoirs (Chapter 2.3.4.1)

There is no quantification of water supply goals needed to test the effectiveness of new storage. The Supplemental Draft EIS includes two options for a Bumping Lake Expansion (BLE); a 200,000 acre-foot and a 458,000 acre-foot capacity reservoir (including the 33,700 acre-feet of existing storage). It is noted that (1) the stored water would be used to improve instream flow for fisheries and to provide a supplemental irrigation water supply during drought years, (2) the proposed allocation of water to each purpose and the recipient(s) of the irrigation water supply are indicated in Chapter 5.3.2.3 (see Chapter 5.3.2.3 comments), and (3) further study is required to define or confirm instream flow requirements on the Bumping River and downstream (Chapter 2.3.4.1, Bumping Lake Expansion).

16-13

Without identification of water supply goals and the manner in which the reservoirs would be operated it is impossible at this time to assess the viability of the storage facilities in meeting the purposes and their impacts on current flow regimes.

The expansion of Bumping Lake has been proposed numerous times as a solution to the Yakima basin's stored water problem and yet Federal authorization has never been achieved. The Supplemental Draft EIS includes BLE as a potential storage measure and it is possible that further planning time and monies could be spent in reevaluating its accomplishments and impacts. Based on what has occurred in the past a prudent approach would be to have an-depth discussion with the stakeholders (and the elected representatives) as to the pros and cons of once again proceeding "down this road" to determine the extent of support for this measure.

It appears the studies referenced in Chapter 2.3.4.1 would be undertaken at various times following the Final Supplemental EIS. How would these studies be financed, who would conduct the studies, what would they entail, and what is the estimated cost and time to complete the studies?

16-14

Wymer Dam (Chapter 2.3.4.2)

The focus of the Supplemental Draft EIS with respect to a possible Wymer dam and reservoir is on reservoir filling by releases from Cle Elum Reservoir. Two options involve a canal from Cle Elum Dam connecting to existing facilities of the Kittitas Reclamation District at different locations and the enlargement and extension of these facilities to convey water to Wymer reservoir. A third option is a new pressurized pipeline(s) between Cle Elum Dam and Wymer reservoir. The capacity of any of these options is estimated to range from 500 cfs to 1,500 cfs depending on the flow to be transported.

The extent of the additional stored water which could result from these options is unknown at this time. Inflow normally stored in Cle Elum Reservoir could be transported to Wymer reservoir for storage allowing some refill of the vacated storage space. However, once the storage control period begins the operation would be primarily one of bypassing some of the stored water required by the Roza and Sunnyside Divisions and the Wapato Irrigation Project by this means rather than by conveyance via the Clem Elum and Yakima Rivers. This operation would help to reduce some of the negative fishery impacts currently associated with the "flip-flop" operation. However, because of the lack of information there is no way to determine the merits of these options at this time. How do you propose to assess the cost effectiveness of these options?

16-15

Fish Habitat Enhancement Element (Chapter 2.3.5)

Aquatic habitat restoration measures are proposed on both the mainstem rivers and the tributaries. Priority measures are identified and reflect proposed measures reported in other documents such as the Upper Columbia Comprehensive Flood Hazard Management Plan, the Yakima River Side Channels Project, and the Yakima Steelhead Recovery Plan.

16-15 The Yakima Steelhead Recovery Plan establishes recovery goals and recovery objectives and criteria as a means of measuring progress towards meeting the recovery goals. The objectives and criteria include abundance, productivity, and spatial structure. However, there is no reference in the Supplemental Draft EIS as to (1) what "measuring stick", if any, is to be used for fish habitat enhancement elements, and (2) how the anticipated accomplishments from these measures will be incorporated to determine the justification, viability, and acceptability of an Integrated Water Resources Management Alternative.

<u>Construction Cost Estimates (Chapter 5.1.3.4)</u>

It is indicated that "the total estimated costs for the new storage elements range from $364.9 million to $2.3 billion (Chapter 5.1.3.4.1, 2nd paragraph). For BLE this was done by applying "Reclamation's composite trend of the construction cost index" to convert a prior estimate to an April 2007 price level.

16-16 As a part of the January 2008 Draft PR/EIS process Reclamation re-evaluated its 1985 cost estimates for Wymer dam, reservoir, and pumping plant. This estimate had been indexed to an April 2004 price level for use in Reclamation's May 2006 Report "Yakima River Basin Storage Alternatives Appraisal Assessment". This re-evaluation concluded that cost indices did not "adequately capture the changing market conditions since 1985, especially with respect to steel and concrete". Since the initial construction cost estimate for a BLE is also 1985 vintage, it is very questionable the $364.9 million estimate is now a good representation of the construction cost. In addition, more detailed estimates or a feasibility-level designs and cost estimate could result in significant changes.

<u>New Storage Element (Chapter 5.3.2.3)</u>

Bumping Lake Expansion (BLE) - - Large Option

The BLE reflects the following reservoir storage allocation:

16-17

Item	Storage Space (acre-feet)
Replacement of existing reservoir capacity	33,700
Additional reservoir capacity	424,300
For proratable irrigation dry-year supply	(100,000)
For fish enhancement	(324,300)
Total	458,000

Proratable Irrigation Dry-Year Supply

The 100,000 acre-feet of reservoir space allocated to irrigation supply would be managed specifically to improve the proratable irrigation water supply of entities "that provide a portion of the funding for the project". It is stated that Kittitas Reclamation District (KRD) and Roza Irrigation District (RID) have expressed interest in participating. It is also stated these entities have indicated they would use the additional stored water only when their water supply would be less than 70 percent of their water entitlement.

16-17 Table 5-5 is then provided to illustrate the increase in the proration percentage for these entities that would occur over a range of additional stored water available. However, this table is misleading for the "volume of increased storage" in excess of 50,000 acre-feet. The proration percentage shown reflects each entity receiving the volume indicated. For instance, there would have to be 200,000 acre-feet of stored water to result in the increased proration percentage shown for the 100,000 acre-feet volume unless one entity were to receive "no additional stored water". However, the intent may be that only one entity, such as RID, contracts for this storage space as in the Summary under Chapter S.5.2.2 ("Long-Term Impacts") the last sentence of the "Surface Water" discussion says "Up to 100,000 acre-feet of water could be retained in a reservoir for use during drought years by a proratable district such as Roza Irrigation District <u>or</u> Kittitas Reclamation District".

16-18 In Chapter 2.1 you indicate meetings with representatives of various agencies, entities, the Yakama Nation, and others have been held to refine and analyze the alternative contained in the Supplemental Draft EIS. It is interesting to note that while Yakama Nation representatives participated in this process an additional water supply to supplement the 350,000 acre-feet of proratable water entitlement of the Wapato Irrigation Project in dry years is not considered. Does this mean the dry year water supply for the Yakama Nation and the Wapato Irrigation Project is adequate and they do not desire to receive additional stored water?

Fish Enhancement Flows

The discussion on fish enhancement flows presents concepts on how water stored in the 334,300 acre-feet of BLE space might be used. The following should be recognized:

16-19

- Improving spring flows in the Keechelus reach of the Yakima River requires the use of Keechelus Reservoir only. Improving spring flows in the portion of the Easton reach downstream of Easton Diversion Dam to the Cle Elum River confluence requires the use of Keechelus and Kachess Reservoirs. The amount of increased spring flow that can be provided is constrained by the volume of stored water needed to be available in Keechelus reservoir for KRD. (Reservoir Management, 4th paragraph).

- To what extent might the summer flows upstream of the confluence of the Naches and Yakima Rivers be reduced with a BLE? (Reservoir Management, 5th paragraph).
- 16-19 While the current September releases from Rimrock Reservoir could be decreased with a BLE, it appears that total flows in the Bumping and Naches Rivers would have to be significantly increased to compensate for this reduction. These releases for consumptive use need to be considered in conjunction with those summer releases for nonconsumptive use downstream of the Parker gage. (Reservoir Management, 6th and 8th paragraph).

The manner in which the information in the "Reservoir Management" discussion is presented can leave the reader with misinterpreting the accomplishments of a BLE specifically as it relates to a supplemental proratable irrigation water supply in dry years. This is because it is necessary to analyze reservoir operations through a series of years when drought conditions occur. This is illustrated by the attachment using water years 1991-1994; 1991 is a "full water supply year" with no proration prior to the three-year dry cycle of 1992-1994 when proration occurred.

The result of the 1991-1994 water years on the reservoir operation for a dry-year proratable irrigation water supply for KRD and RID is shown in the following table.

16-20

Year	Proration Percentage Without a BLE	Supply Available without a BLE (acre-feet)	Supply from a BLE (acre-feet)	Total Supply Available (acre-feet)	Proration Percentage with a BLE
Kittitas Reclamation District - - Entitlement 336,000 acre-feet; 70percent of entitlement 235,000 acre-feet					
1991	100	Full	0	Full	100
1992	70	235,000	0	235,000	70
1993	56	188,000	47,000	235,000	70
1994	28	94,000	14,000	108,000	32
Roza Irrigation District - - Entitlement 375,000 acre-feet; 70 percent of entitlement 262,000 acre-feet					
1991	100	Full	0	Full	100
1992	70	262,000	0	262,000	70
1993	56	210,000	52,000	262,000	70
1994	28	105,000	15,000	120,000	32

The foregoing indicates a BLE cannot provide a 70 percent irrigation proratable water supply to both KRD and RID in the third year of the three-year (1992-1994) drought cycle. At the end of the second year of the drought (1993), contents in the 100,000 acre-feet of the irrigation storage space are down to 16,000 acre-feet. In 1994, the total proratable water supply provided is 228,000 acre-feet (199,000 acre-feet from the existing Yakima Project and 29,000 acre-feet of

BLE storage and inflow). The resulting proration percentage is 32 percent which is 229,000 acre-feet short of providing a 70 percent proratable water supply. An inconsistency in this BLE operation illustration is that all inflow is assigned to the 434,300 acre-feet of new storage
16-20 operation. Consideration will need to be given to the operation of the 33,700 acre-feet of replacement storage (and the bypass of inflow which is now spilled when the reservoir is full).

If the 100,000 acre-feet of irrigation storage space is assigned to only one entity such as RID, the proration percentage in 1994 would be 48 percent and RID would receive about 76,000 acre-feet from a BLE including inflow.

Summary of Impacts

Table 5-11 ("Summary of Impacts by New Storage Elements in the Naches River Basin") indicates a BLE will have no change or benefit downstream in the Bumping River and in the
16-21 Naches River to the Tieton River confluence. How can the current downstream flow regime not be impacted when a significant portion of the inflow to a BLE will be stored rather than being spilled as is now done from the 33,700 acre-foot reservoir?

Wymer Reservoir

The first paragraph regarding a Wymer reservoir of 162,500 acre-foot capacity indicates 80,000 acre-feet of the storage space could be operated to provide a supplemental proratable irrigation
16-22 water supply when the proration percentage is less than 70 percent "or it could be operated in a manner similar to that described for the Bumping Lake expansion option". The operation referred to in the foregoing quote is not clear. In any case, the 80,000 acre-feet of dry-year irrigation storage is not adequate to provide a 70 percent proratable supply during a repeat of the 1992-1994 dry cycle.

<u>Conclusion</u>

The "Next Steps" described in Chapter 1.5 states "After the separate NEPA and SEPA processes are complete, Ecology and Reclamation anticipate working jointly to identify ways to fund and implement the alternatives identified as feasible in the NEPA and SEPA processes". Reclamation's December 2008 Final PR/EIS indicates the No Action Alternative has been
16-23 selected as the Preferred Alternative as "Reclamation does not consider the benefits provided by each Joint Alternative, when weighed against the respective impacts and costs, to provide sufficient justification for moving forward with any of the three alternatives".

One can surmise from the foregoing that the Record of Decision for the Final PR/EIS will, for all practical purposes, "shut the door" on the joint alternatives as undertakings pursuant to the Reclamation process. What is missing is how all of this "joint endeavor after completion of the NEPA and SEPA processes" is going to be put together - - technically and institutionally.

The Supplemental Draft EIS infers the Integrated Water Resource Management Alternative provides a new direction or vision to resolving the basin's water problems. This is completely not factual as a "Comprehensive Integrated Program" concept has been inherent in Yakima basin planning activities since initiation of the Yakima River Basin Water Enhancement Project work. In the early 1980s, it was recognized a comprehensive effort of structural and nonstructural measures would be necessary to improve the basin's water supply and aquatic habitat. It was also recognized that some aspects of a comprehensive program could and should proceed in advance of others. Improvements in fish passage and protective facilities at the main-stem river diversions were put on a "fast-track" (Phase I) by means of a cooperative undertaking of Federal, State, and Local interests and the Yakama Nation and Bonneville Power Administration. This has been expanded to include the tributaries.

Subsequently, it was mutually determined by the stakeholders that the next focus should be water conservation, water acquisition, fishery enhancement measures in the tributaries, and on-reservation activities. Title XII of the Act of October 31, 1994 (Phase II) was enacted authorizing the Basin Conservation Program and other measures including activities in the Yakima basin tributaries to improve the aquatic resources. Tributary habitat restoration activities have always been a complex and time-consuming undertaking. In the mid-1980s as a part of the YRBWEP activities considerable effort was made to address anadromous fishery concerns in the
16-23 tributaries. However, some tributary water users objected to the involvement of Reclamation and the State because of concerns that improved tributary streamflows and habitat conditions would equate to enhancing anadromous fishery which in-turn could adversely affect irrigation water rights. It became apparent that tributary enhancement would require focused attention and a long-term effort with individual diverters and landowners to be successful. Because of the acceptability of the Taneum Creek water users to consider fishery enhancement measures this tributary was included in Title XII with the provision that other tributary enhancement programs could also be pursued with agreement of the water users.

Many of the tributary measures discussed in the Supplemental Draft EIS could be implemented under this authority with conjunctive Federal-State-Regional funding. Federal funding would require compliance with the provisions set forth in Section 1207 and include among other things the preparation of a report describing the posed action, the costs, impacts, etc. The recently completed report of proposed measures in Manastash Creek may be an example. Further the work of the Yakima Basin Fish and Wildlife Recovery Board fits well within the framework of Title XII.

Additional storage, considered by many as Phase III of the Yakima River Basin Water Enhancement Project, has long been proposed as one of the major items. However, the ability to bring this to fruition has been very elusive. The most recent effort (the Storage Study) has resulted in the "preferred plan" being designated as the No Action Alternative or "status quo". This means there would be little change in the volume of stored water available in a repeat of dry

years such as 1992-1994, 2001, and 2005 when extensive proration of the available water supply occurred. While the Supplemental Draft EIS does include potential storage measures there are serious questions of what these will accomplish in addressing the water resource problems, their acceptability from an environmental and social perspective, and the costs and the benefits. The major storage measure, Bumping Lake Expansion, has "been on the table" numerous times and each time has failed to move forward.

16-23

An important question at this stage seems to be "is there the political will (within the respective agencies and with the elected representatives) to support additional storage and to undertake the actions necessary to secure Federal and State authorizations and the appropriations necessary for implementation?" It is suggested that a serious open dialogue with the elected representatives and the stakeholders should be undertaken to once and for all address the reality of obtaining authorization for additional storage development for the Yakima basin!

Sincerely,

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With Attachment

Attachment to January 6, 2009 Comments on Supplemental Draft EIS

16-24

Assumptions for Bumping Lake Expansion Operation Illustration

- The additional BLE storage space of 434,000 acre-feet is full at the end of water year 1990 (October 31, 1990).
- The volume of water available for storage is from Table D-2 which is the monthly inflow less the minimum flow required for the Bumping River downstream of the dam of 130 cfs.
- In the illustration, the storage space for fish enhancement remains at full pool (324,300 acre-feet). This was done because of the numerous fish enhancement options and does not impact the irrigation operation.
- Inflow was shared in the following manner:

  If BLE is full and proratable irrigators have a full water supply all inflow is bypassed for fish enhancement.

  If the irrigation storage space is full and proratable irrigators have a 70% water supply, November – March inflow is bypassed for fish enhancement and April-October inflow is distributed in proportion to the allocated storage space - - fish (76%) and irrigation (24%).

  If the irrigation storage space is not full and the proratable irrigators have less than a 70% water supply, the April-October inflow is distributed in proportion to the allocated storage space - - fish (76%) and irrigation (24%). In 1993 and 1994 the only inflow during November – March incurred in March for simplification it was all bypassed for fish enhancement.

  Supplemental proratable irrigation water was provided only when the proration percentage is less than 70 percent and then the volume of stored water provided is that necessary to bring the proratable irrigation supply to 70 percent.

Note: This illustration may be optimistic as it assumes a portion (24 percent) of the April-October reservoir inflow is used to meet the supplemental proratable irrigation needs when the proration percentage is less than 70 percent. This occurs in 1993 and 1994 and amounts to a total of about 28,000 acre-feet.

16-25

Rough Operation of Bumping Lake Expansion (Water Years 1991-1994)

		Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total	Storage		Release/Bypass		% Irr
															Fish	Irr	Fish	Irr	Without
		(1,000 acre-feet)																	
Reservoir Inflow															334	100			
1991		34	7	7	22	4	11	24	27	13	0	0	0	150	0	0	132	18	100
															334	100			
1992		2	2	3	5	10	18	21	3	0	0	0	0	64	0	0	54	10	70
															334	100			
1993		0	0	0	0	3	8	42	13	0	0	0	0	66	0	-84	51	15	56
															334	16			
1994		0	0	0	0	4	18	28	0	0	0	0	0	60	0	-16	47	13	28
															334	0			

Comment Letter No. 16 – Larry Vinsonhaler

16-1	Comment noted.
16-2	See the Master Response regarding the programmatic nature of this EIS. Additional detail and analysis have been included in this Final EIS; however, the document is still programmatic. Project-level analysis would be conducted under NEPA and/or SEPA as specific projects are carried forward.
16-3	Comment noted.
16-4	See Section S.5 in the Final EIS regarding how the Integrated Water Resource Management Alternative will be implemented.
16-5	The *Principles and Guidelines* and the Net Economic Development criteria apply to projects that are federally funded. Ecology does not have to follow those criteria to evaluate the benefits of projects.
16-6	Ecology reviewed the scoping comments submitted by WDFW, but did not believe that calculating the monetary benefits of the Yakima River basin fishery was appropriate for a programmatic EIS. Such calculations may be appropriate and may be conducted in the future as implementation of the Integrated Water Resource Management Alternative proceeds.
16-7	See the response to Comment 6-6 regarding implementation of the Integrated Water Resource Management Alternative and formation of a Work group to help steer implementation.
16-8	The State Alternatives from the January 2008 Draft Planning Report/EIS have been incorporated as elements of the Integrated Water Resource Management Alternative in this Final EIS. The Enhanced Water Conservation Element (Section 2.3.7) includes projects located within the Wapato Irrigation Project that will address the issues mentioned.
16-9	Under SEPA, the No Action Alternative is intended to provide the baseline for comparison of the Action Alternatives. The criteria for which projects are included in the No Action Alternative are included in Section 2.2 of this Final EIS. Both the Supplemental Draft EIS and this Final EIS evaluated the benefits and impacts of the elements of the Integrated Water Resource Management Alternative in comparison to the No Action Alternative. SEPA regulations do not require Ecology to conduct an economic analysis during preparation of an EIS. Appropriate economic studies will be conducted on elements of the Integrated Water Resource Management Alternative that are carried forward. Ecology has updated the description of the No Action Alternative in this Final EIS to remove those projects that have been implemented since the Supplemental Draft EIS was written.
16-10	Reclamation and Ecology have begun the process to prepare a project-level NEPA/SEPA EIS for fish passage and fish reintroduction at Cle Elum Lake. That EIS will include additional analysis of the impacts of fish passage facilities on water rights, operations, and water supply. Similar studies would be conducted for any other fish passage projects carried forward.
16-11	Comment noted.

16-12	Although the mentioned measures are included in the No Action Alternative of Reclamation's Planning Report/EIS, they are included in the Integrated Water Resource Management Alternative in this EIS because they have not yet received funding. See Section 2.2 of the Final EIS for an explanation of what Ecology has included in the No Action Alternative.
16-13	Comment noted. The funding for additional studies following the Final EIS has not yet been secured but will likely come from a mix of federal and state sources. Reclamation and Ecology are convening a work group to develop the comprehensive implementation plan for the Integrated Water Resource Management Alternative as described in Section s.5 of this Final EIS.
16-14	Additional RiverWare modeling of operations has been completed and is included in the Final EIS. Additional and more detailed studies, including cost effectiveness, will be required in the next phase of study.
16-15	The criteria for selecting projects would be developed as part of the implementation plan for the Integrated Water Resource Management Alternative. See Section S.1.
16-16	Comment noted. Additional cost analysis would be conducted when any element of the Integrated Water Resource Management Alternative is carried forward.
16-17	The table where you suggest changes has been deleted from this Final EIS.
16-18	The Yakama Nation has commented (see Comment 1-10) that the additional 100,000 acre-feet of storage is a goal of Roza Irrigation District and does not take into account potential new supply for out-of-stream use on the Yakama Reservation.
16-19	A more detailed discussion has been added to the Final EIS that includes data from RiverWare model analyses.
16-20	The section where you suggest changes has been rewritten in this Final EIS.
16-21	Although Bumping River and Naches River flows will be reduced when the reservoir is filling, the flow regime would not be negatively impacted the entire year because the enlarged Bumping Dam would be operated to reduce effects on flow.
16-22	Comment noted. The operation discussion was clarified in the Final EIS.
16-23	Comments noted. Additional information has been provided in Section S.5 regarding how the Integrated Water Resource Management Alternative will be implemented.
16-24	Your inclusion of assumptions for Bumping Lake expansion operation is noted.
16-25	Your inclusion of the table illustrating Bumping Lake flows is noted.

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Mr. Sandison,

17-1 The concept of approaching water supply challenge in the Yakima Basin in an integrated fashion has great merit. However, some of the projects which make up the Integrated Water Resource Management Alternative in the Supplemental Draft Environmental Impact Statement, Yakima River Basin Water Storage Feasibility Study could provide better benefit to both fish and irrigated agriculture if they were redesigned to take an integrated strategy to address both fish/instream flow and irrigation issues.

I am currently working on a Masters in Resource Management at Central Washington University. For my thesis, I have spent the last year and a half studying water management options on the western edge of the Kittitas Valley, the area served by the Kittitas Reclamation District (KRD) south branch, as well as Manastash, Taneum, Big and Little Creeks. As part of this research, I have interviewed stakeholders, including irrigators, irrigation district officials, engineers, non governmental and government organizations involved in fish habitat and instream flow and water management officials. I have also read the KRD water efficiency plans prepared by CH2MHill in 1999 and 2000 that form the basis for the KRD portion of the integrated strategy.

17-2 My research has made it clear that the conservation plans as written provide only a small benefit to the KRD or creek irrigators and they fail to maximize potential instream flow benefits. In addition, it is worth noting that the KRD has already been given the opportunity to consider these plans and chose not to implement them. These plans call on the district to invest money in areas that it considers to be low priority, such as improvements to laterals. The district places a much higher priority on fixing problems with its main canal system, to ensure that it is capable of delivering water to its customers, but these issues are not addressed in either the CH2MHill plans or the SEIS.
17-3 In addition, the SEIS plan assumes that the KRD would be prepared to carry water for non-KRD users and that it has the technical accuracy in delivery to do this without risking impairment to water supplies for KRD users. This assumption is contradicted by the KRD approach to water allocations: it treats water shares as part of a "pool" because the existing infrastructure does not allow it accurately monitor water deliveries to individual users. The plan also assumes that creek irrigators would be prepared to exchange their senior creek rights for proratable KRD rights, and that they would be willing to rely exclusively on the KRD for water delivery, even though the irrigators in this valley are fully aware that the KRD canal has the potential for catastrophic failure.

17-4 I propose that Ecology modify the portion of the SEIS that address changes to the KRD in order to increase the benefit to all stakeholders. This would involve upgrading the KRD infrastructure to increase its reliability and to allow the KRD to accurately measure water deliveries, which would open up the possibility of both having the KRD carry non

17-4 KRD water and it would offer improved options for water trading. Benefits would be maximized if the following changes were made:

- Pipe the entire KRD south branch and add a reregulating reservoir. This change would reduce the amount of water needed to meet deliveries for KRD members by 20-30%. In addition, by upgrading the entire system and not just selected laterals, it would be possible to individualize deliveries even in dry years, when the KRD is currently forced to suspend deliveries early. This would provide a tremendous benefit to irrigators. The excess capacity freed up by reducing water losses could be used to improve instream flow, either by replacing water removed by irrigators with creek rights or by providing water in place of creek diversion.
- Meter all water deliveries: This measure would provide accountability. If the system is piped and deliveries are metered, then each individual user would be able to take water at the time of day and season that was the most beneficial for their crops, irrigation technology and soils. In addition, this would open up opportunities for water trading – potentially making it possible for KRD users to lease water for instream flow. Finally, by piping the system and metering water deliveries, the KRD would be able to carry water for non-KRD uses as it would be able to ensure that this water did not reduce allocations for KRD members.
- Extend the KRD network so that it could provide water to creek right holders that do not currently receive KRD water.
- Repair the most critical sections of the KRD mainline canal above the bifurcation where the South Branch diverges from the main canal. This would provide an assurance of water delivery as there is little point in building an elaborate system to deliver water across the last few miles if you cannot guarantee water into the system. Improving the infrastructure would also make the system more attractive to creek irrigators, as they would have more confidence in transferring water to the KRD network.
- Once the infrastructure is in place, there would be multiple options to improve creek flow:
    - The KRD could carry water to the creeks, putting it in just below the irrigation diversions.
    - Creek irrigators could change their diversion point to Lake Easton, and receive their water through the KRD network. Ideally, this would be done in a way that protected the seniority of their water right while giving the irrigators a partial storage benefit in the late summer.
    - Water leases for in-stream flow could be negotiated on a temporary or permanent basis with any of the water users in the combined system. This would be much easier than negotiating water leases with just the creek irrigators as the volume of water delivered by the KRD to the South Branch is much greater than the creek rights and many of the smaller KRD users either do not have access to their water, or do not need their full allotment.

17-5 If this proposal were implemented, all stakeholders would benefit:

- Creek irrigators would receive many benefits if they switched to the KRD infrastructure. One of the largest would be more control of the timing of the water. Creek rights are inherently variable: the creeks can run low as early as May or carry water until late summer. Since the amount of water that the KRD would need to withdraw from the reservoirs in the peak season would be reduced by the conveyance savings, that storage water could be used for the creek irrigators as part of their water supply.

- All irrigators would benefit from increased control over their water, allowing them to apply just the right amount of water in dry years. This control would reduce the amount of water that is wasted and, thus reduce the total amount of water needed to grow a given crop. In addition, if the South Branch was fully piped and a reregulating reservoir constructed, there would be no technical reason why that portion of the KRD would need to be turned off early in dry years. There would be no water losses within the KRD system and water losses in the main canal are already covered by the USBR, which already sends water down the KRD canal whenever there is surplus capacity in late summer. The benefit to KRD irrigators of being able to control water deliveries throughout the season would be tremendous, particularly as Timothy survives best in dry years if it can be "put to bed wet" at the end of the summer, something that is impossible with
17-5 the current irrigation delivery system. Irrigators who use sprinklers or other pumps with their irrigation water would also benefit from power savings, as they would not longer need electricity.

- The KRD would benefit from a more reliable infrastructure, particularly improvements to the main canal. Recent problems, including the failure of canal sections and canal damage from flood runoff flowing into the canals would be eliminated. Routine maintenance would also be reduced.

- Fish benefits would be tremendous. At a minimum, this plan would provide water to improve instream flow in all four tributaries. Irrigation diversions could be completely eliminated from one or more of the tributaries if irrigators were willing to change their diversion point. In addition, the plan opens up opportunities for water trading. Instead of being limited to leasing water from creek irrigators, if the plan was implemented, it would be technically feasible to lease water from the much larger body of KRD irrigators, reducing the cost of purchasing water for instream flow. This would be particularly valuable in very dry years, when rural homeowners on the KRD system may be much more willing to lease water for fish than large irrigators, who risk the loss of their investment.

The fundamental concept, of improving the KRD and using its infrastructure to maintain instream flow in the four creeks, either by delivering water directly to irrigators in lieu of creek rights or by putting water into the creeks to replace diverted water, is excellent. If the plan were modified slightly it could provide huge benefits to the irrigation
17-6 community, increasing the likelihood of buy-in by both the KRD and creek irrigators, and at the same time, it would provide greater benefit for fish and instream flow. By modifying the plan, it would be possible to provide improvement for five of the objectives listed in section 1.2 of the draft EIS.

Comment Letter No. 17

- *Demand for irrigation water cannot always be met in years with below average runoff, leading to reduced (prorationed) irrigation water for junior rights holders in drought years*. Even if the KRD water allocation is not increased in normal years, water savings from piping could be used to increasing the amount of water available to the KRD in years with prorationing. After piping, the Yakima Tieton Irrigation District (YTID) had its water right reduced because it no longer needed to divert water to meet conveyance losses. However, rather than simply reducing the total right, although the YTID right was modified to give them a maximum diversion lower than their original right, the original right was used as the basis for prorationing. If this was done for the KRD, then KRD irrigators would face less of a burden in dry years.
- *In dry years, farming and related income is reduced*. Management techniques can reduce losses in dry years, but only if the farmer has the ability to maximize water use for his particularly crops and conditions. It takes less water to grow a crop with efficient irrigation, such as sprinklers, than with rill irrigation. In addition, in a perfect world, irrigators would have a wide range of options to maximize benefit from water when supplies are short. For example, if a farmer had control over their water supply, they could leave part of the acreage fallow and fully irrigate the remaining land. Total losses would be much less than partially irrigating the full acreage, as no expenses would be required for the fallow land, while the quality and quantity of production on the remaining land would be higher.
17-6 Irrigators could also maximize water benefit by not irrigating during the hottest part of the day or by investing in efficient irrigation technologies. Irrigators in the KRD do not have the technical capability to maximize water use because the KRD's inefficient and aging infrastructure delivers water at a constant volume for 24 hour periods, and, in dry years, conveyance losses combined with the need to maximize early season water supplies to meet the demands of the primary crop, Timothy, force the KRD to shut water deliveries early. If irrigators had complete control over their water delivery: timing during the day and season, and volume, they would have the ability to make individual decisions which would maximize income in dry years. With the current system, they do not have this ability.
- *In most years, spring flows in the middle and lower Yakima River are not sufficient to optimize the survival of out-migrating smolts*. If this plan were implemented, with creek irrigators given the ability to take part of their water allocation from the reservoirs, then the amount of water flowing into the middle and lower Yakima River could increase as the full spring flow of the Manastash, Taneum, Big and Little Creeks would flow into the Yakima Canyon. The amount of water diverted by the KRD, and thus not available in the upper Yakima, would be reduced slightly, but spring flows in that reach are not identified as a significant problem in the SEIS.
- *Water rights in most of the basin are full appropriated, making it difficult to acquire water rights to meet future municipal and domestic water demand*. By piping and metering all water that is delivered to the area served by the South Branch and the four creeks, opportunities for water trades and reallocation of water resources would be increased. With the current system, there is very little good information on the amount of water any one party is used, which impacts the

17-6 opportunities for water trading. Legal barriers to trading KRD rights would remain, but the technical infrastructure would exist to support trades of either creek or KRD rights.

17-7 The cost of this project is not out of line with other proposals that are being considered. Using figures from the KRD and CH2MHill and comparing the project to other plans, a very rough estimate for the cost of the South Branch portion, including providing water to creek irrigators is $20-$30 million. I do not have any estimate for the cost of mainline improvements, which would be a critical component of the system as it makes no sense to invest money in upgrading a system when delivery of water to the system cannot be assured. I am attaching a document that I prepared for YRBWEP with crude estimates of both cost and the impact of the project on water supplies for Manastash, Taneum, Big and Little Creeks.

I would be happy to provide additional elaboration on any element of this proposal.

Jennifer Hackett
Central Washington University, Resource Management Program

Jennifer Hackett
CWU-REM Program

Water Savings and Cost to Improve the Infrastructure of Irrigation Diversion and Delivery on the West Side of the Kittitas Valley

17-8 **Potential Water Savings** and the impact on water diversions and delivery potential if the KRD South Branch were piped and water that is currently being diverted from Manastash, Taneum, Big and Little Creeks was provided via a piped delivery system that takes water through the KRD infrastructure.

Water User	Water Right	Efficiency Estimate	Estimated Delivery	Potential Savings
KRD	61183[1]		43780[2]	17403
Manastash	20000[3]	0.7[4]	14000	6000
Taneum	11834[5]	0.75[6]	8876	2959
Big Creek	1464	0.85	1244.4	220
Little Creek	462	0.85	392.7	69
Total			68293.1	26651
Total Less KRD			24120.4	
KRD savings - non-KRD use	6717			

Based on these numbers, if the water delivery systems for Manastash, Taneum, Big and Little Creek were piped, it would take approximately 24120 acre feet/year to deliver the same amount of water to the farms that they are currently receiving. If the KRD South Branch were fully piped, the potential water savings would be 17,403. In order to replace the diversions from all four creeks with water diverted from the Yakima River at Lake Easton and delivered through the KRD infrastructure, it would be necessary to divert an additional 6717 acre feet/year from Lake Easton. This would not result in a net decrease in water entering the Yakima Canyon, as the additional water that was being diverted at Lake Easton would be balanced out by water that was left in the creeks. It would, however, result in a decrease in water flowing between Lake Easton and the mouth of the creeks during the spring freshet, when water that would have flowed

[1] KRD water rights are based on the CH2MHill calculations that the KRD diverts 5.59 acre feet/acre/year and KRD data that the South Branch Ride contains 10945 acres. in a normal year, and the KRD.
[2] The KRD estimated delivery is based on the KRD allotment of 4 acre feet/acre/year to cover their estimates of system operations losses.
[3] The Manastash Creek water right is based on the CH2MHill 2002 Water Conservation study of actual water withdrawals. This is less than the water right, as the creek is over allocated.
[4] The Manastash Creek efficiency estimate is based on the CH2MHill 2002 study.
[5] The Taneum, Big and Little Creek water right is taken from Addendum No 1 to the CH2M Hill Water conservation plan supplemental information.
[6] The Taneum, Big and Little Creek efficiency estimates are derived from the numbers from Manastash Creek and the KRD, but adjusted down to reflect the shorter length of these canals.

through the upper Yakima would now be diverted into the KRD canal. Much or all of this difference could be balanced by on farm water conservation. For example, in the CH2MHill 2002 Water Conservation Study, they calculate that water conservation on 2,232 acres (less than 1/5th of the acreage receiving water from these sources) would result in a savings of 3,970 acre feet, or about 60% of the shortfall. It would also be possible to avoid a shortfall by leaving some irrigation diversions in one or more of the creeks. In addition, it would be important to balance the fish benefits of free flowing creeks against the cost to fish of a reduced spring flow in the upper Yakima.

In addition to evaluating the balance between water savings and new water diversions in terms of total annual diversions, it is also important for this project to consider the impact on maximum peak flow as there are flow restrictions that impact the
17-8 ability of the KRD to service non-KRD users in the South Branch area. KRD manager Ken Hasbrook estimates that the South Branch is typically operated at a maximum of 220 cfs, although he believes it could support higher flows. If one assumes an efficiency of 25% for the KRD, a figure Mr. Hasbrook has indicated he believes the board could accept, then, in order to maintain peak deliveries for KRD users, the KRD would only be able to provide 66 cfs of capacity during the July-September time frame. This number is achievable even without any on-farm efficiencies. The maximum cfs for Priority 1-4 water users on Manastash Creek starting July 1 is 27.719. By July 1st, water users with lower priorities are generally not able to take delivery of their water. On Taneum Creek, the water right for the largest user, the Taneum Canal Company, only extends to June 30th. The remaining users, who have the right to divert during the period when the KRD demand is at its peak, have a right to a total of 14.97 cfs. This leaves approximately 24 cfs of capacity with the current delivery capability that could be used to deliver water to the users on Big and Little Creek, or to provide creek users with additional flexibility on the timing of their water delivery.

Estimated Cost:

Cost estimates for this project were based on data from the KRD on system parameters, on information from CH2MHill on estimate irrigation projects, and on data from the CH2MHill water efficiency studies of the KRD completed in 1999 and 2002. The cost of a reregulating reservoir was estimated looking at the cost estimate from the CH2MHill 1999 study, and the actual cost of constructing larger reregulating reservoirs for the Sunnyside Irrigation District. These cost estimates do not include the cost of a SCADA system, or of meters to measure use, nor do they include any costs for new right of ways or other issues that might arise during program implementation. For this reason, the numbers are probably on the low side, but they provide a framework for consideration.

Cost to pipe the KRD[7]	78514.776' (14.87 miles)	$14,784,866.00
Reregulating Reservoir		$3,045,000.00
17-9 Cost to pipe Manastash	51700 ' (9.79 miles)	$4,409,678.00
Cost to pipe big and little creeks	3332' (.63 miles)	$351,742.00
Total:		$22,591,286.00

Assumptions made in estimating cost:

- KRD figures were taking from the KRD GIS data layer. Maximum cfs was taken from the GIS data. Where a maximum was not given, it was estimated at 35cfs. The CH2MHill 2002 study of the KRD stated the capacity of some of these laterals at between 17 and 34 cfs. 35 cfs was selected on the assumption that added capacity might be needed. The equations to calculate pipe size from cfs figures were provided by Dick Haapala at CH2MHill.
- The cost of piping (materials and installation) was estimated to be $4.5/inch of pipe diameter. Dick Haapala had suggested that the range for a rough estimate would be $4-$5.
- Although it would probably be better to deliver Manastash water via the KRD infrastructure to users with KRD acreage, for the purpose of these estimates, it was assumed that pressurized pipe would be installed in place of all of the ditches currently delivering Manastash water. The pipe size and length was based on figures in the CH2MHill 2002 study
- As I had no data on the length of canals providing water to Big and Little Creek or the maximum cfs delivery of those canals, costs were extrapolated from available data. In the conservation supplement, CH2MHill provided a figure of 13,350 feet of pipe to replace diversions on Big, Little and Taneum Creeks. Based on the KRD GIS data, which includes the major canals on Taneum Creek, I calculated that 10,018' of this was for Taneum. For these calculations, I assumed

[7] Including Taneum, Brutun and Turner Ditches that divert water from Taneum Creek.

that the remaining length of 3332' represents the piping that would be needed to replace diversions on these creeks. I guestimated the capacity at 15 cfs.

17-9 To evaluate the veracity of this cost estimate, I looked at the cost of other projects that have been proposed recently. The most similar project was the Naches-Selah Irrigation District plan which included many of the components of the KRD plan and covered a similar amount of land.

Naches-Selah Irrigation District Plan

1 Replace two miles of wood flume
2 Enclose all open canal laterals into gravity pipe (serves 11,000 acres)
3 Develop SCADA system for 1/2 district
4 Construct an 80 a-f equalization reservoir
5 Improve 10 miles of the 15 mile Main canal

$34.2 Million
15,000 acre feet savings per year

Comment Letter No. 17 – Jennifer Hackett

17-1	Comment noted.
17-2	Comment noted. This EIS is intended to evaluate the benefits and impacts associated with implementing water resource improvements in the Yakima River basin. It was not intended to evaluate specific operations of the Kittitas Reclamation District (KRD). The improvements to KRD operations included in this EIS are those which would improve tributary flows and could be used to supply water to Wymer reservoir.
17-3	Ecology has consulted with KRD during the preparation of this EIS, and KRD has indicated that under certain conditions it would be willing to deliver water to other users. See the response to Comment 8-6 regarding water rights exchanges. Both Ecology and KRD believe that you have overstated the potential for failure of the KRD canal.
17-4	Comments noted. Ecology will continue to work with KRD to determine the optimum modifications to the KRD system that would meet the objectives of this EIS.
17-5	Your comments regarding the benefits of your proposal are noted.
17-6	Comments noted.
17-7	Comments noted.
17-8	The receipt of your water and cost saving estimates is acknowledged.
17-9	The receipt of your cost estimates is noted.

-----Original Message-----
From: Margie Van Cleve [mailto:vancleve@charter.net]
Sent: Friday, January 16, 2009 11:03 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

Dear Mr. Sanderson,
Thank you for the opportunity to comment on the Department of Ecology's Supplemental Draft EIS.

18-1

The Pacific Northwest Electric Power Planning and Conservation Act (the Act) was passed in December 5, 1980. One sentence from the Summary of the Act states, "The plan is to set forth a general scheme for implementing conservation measures and developing resources to reduce or meet the Administrator's obligations related to environmental quality and the acquisition of electric power resources." Per the North West Energy Coalition (http://www.nwenergy.org/issues/energy-efficiency), "Since that time the Northwest has saved approximately 3,000 average megawatts of electricity through conservation and energy efficiency." It also legally defined conservation as an electric power resource for the purposes of planning.

I would like to see the Supplemental Draft EIS be the beginning of a new Act for the Yakima Basin. I would like to see, (to paraphrase the Act) "the plan to set forth a general scheme for implementing conservation measures" (first priority) and developing resources to reduce or meet obligations related to environmental quality and the acquisition of water resources (second priority), rather than the other way around.

Most of the irrigation districts in the Yakima basin are gravity flow and not pressurized, Less than five years ago our irrigation district held a rather spirited general meeting because they proposed that users be fined $250 if they did not use their full irrigation allotment. Thankfully, the proposal did not pass.

How much irrigation water in the Yakima basin is being delivered via row and furrow irrigation? What is the value of the crops being irrigated via row and furrow? What is the value of the water being used to irrigate those crops? Is there a positive return on investment? As land in the upper Yakima basin is subdivided from crops to houses, how much irrigation water is allotted for watering nonporous surfaces such as roofs and roads? How do we get that water available to other users (fish and farmers)?

18-2

I believe it is premature to investigate additional storage at this time. I would like to see the Department of Ecology continue to press for enhanced water conservation and water markets using the philosophy of implementing conservation measures first rather than as a continual "also-ran" to storage proposals, storage studies, etc.

I believe the expansion of the Bumping Lake Reservoir is particularly unwarranted.

Thank you for your time.

Regards,

Margie Van Cleve
272 Mapleway Road
Selah, WA 98942

Comment Letter No. 18 – Margie Van Cleve

18-1	Comments noted. The Integrated Water Resource Management Alternative presented in this Final EIS includes an enhanced water conservation element.
18-2	Comments noted. Ecology has incorporated enhanced water conservation and water marketing in the Integrated Water Resource Management Alternative presented in this Final EIS. However, Ecology believes that additional storage is needed to meet the water supply needs for irrigation, fish, and municipalities.

January 4, 2009
3030 Thrall Road
Ellensburg, WA 98926

RECEIVED
JAN 06 2009
DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

David Kaumheimer
Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901-2058

Derek Sandison
State Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902-3401

Re: Black Rock Dam

Gentlemen:

Some 30 plus years ago, I recall forward looking people working to find solutions for the future of potential water problems in the Yakima River Basin.

Some six years ago our Congress and the State of Washington gave your Departments a mandate to study plans that would create additional "new" water storage in the Yakima River Basin.

Six years ago and 18 million dollars later you both failed. The BOR "No Action" alternate to do nothing begets nothing and adds not one drop of new water to our YRB.

Ecology, your studies and recommendations are true and good, repairing canals, pumping stations, shorelines, and fish ladders are needed and conservation plans help – "But" this
19-1 adds not one drop of new water to meet our present and future needs.

You both say Black Rock Dam "costs too much," compared to what? Studies show in 1970 BRD would have cost about 2.6 billion dollars. Today 30 years later, BRD will cost some 7.7 billion. 30 years ahead to 2038 BRD will cost some 12.8+ billions plus. Meanwhile, the YR Basin slowly dies from years of lack of decision.

BRD, by your study, is the only site that meet all the criteria set by Congress. You said it could be built, that probable water seepage can be recaptured and reused.

BRD could solve our water problems for years to come, put thousands of people to work, restore our fisheries, and help our junior water right holders get their fair share of available water.

Bureau of Reclamation: Your "No Action" alternate means do nothing, 30 years of time, money, and effort wasted and no water solutions.

19-1

My hope is that those who follow you will show the foresight and courage your predecessors had to build the great dams that serves our western states so well even though at that time they "cost too much."

Sincerely,

Joseph Lowatchie Sr.

Joseph Lowatchie Sr.
509-962-3033

Comment Letter No. 19 – Joseph Lawatchie, Sr.

19-1	Your comments in support of Black Rock reservoir are noted.

Comment Letter No. 20

January 3, 2009

RECEIVED

JAN 07 2009

DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Washington State Dept. of Ecology

Re: Black Rock

To Whom It May Concern:

20-1 Black Rock Reservoir is the best alternative for future water in this valley. As lifelong residents of this area, my husband and I have seen the ups and downs of water use. We have junior rights in Roza Irrigation and know what drought can do. We have watched as different proposals have been made in the past 30 years but nothing has been done. We need Black Rock and the sooner the better. We feel the following are good reasons for Black Rock:

1. Sustainability - a recent TV news report covered the recession and said Washington State is in a good place because we produce food and it is always in demand. With no water for production, we cannot sustain this advantage.

2. Fish habitat improvements - with Black Rock, we could help restore fish by increasing water supplies.

3. Environment - with Black Rock, we would have more water for everyone - animals and humans. We know there are concerns about resorts damaging the area, but this could be handled in a way to benefit all parties. We realize that conservation is great, but when there is no water there is nothing to conserve. Also, irrigation water adds to surface water which can help domestic wells.

Of course the cost will be great, but the cost of doing nothing will be greater. Let's think about the future and not the past. Our current water supplies were okay for the last century but we need Black Rock for this century.

Sincerely,

Karen Pilon

Karen Pilon
509 Bittner Rd
Yakima, WA 98901

Comment Letter No. 20 – Karen Pilon

20-1	Your comments in support of Black Rock reservoir are noted.

RECEIVED
JAN 16 2009
DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

January 15, 2009

Derek I. Sandison – *SEPA Responsible Official*
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, Washington 98902

Or will e-mail to dasn461@ecy.wa.gov or both.

Subject Line: Yakima Supplemental Draft Comments as requested.

Dear Derek Sandison:

21-1 I am an interested party, believe me! As I respond to your request for comments I have no doubt that Jay Manning has placed in your hands a very difficult chore to handle and help solve. The facts appear that even with best intent, both of you have failed miserably to recognize or realize the real issue. That is, to provide enough real water, especially in times of severe droughts and that it be made available for the Yakima River Basin in a manner that serves the aggregate community effectively and timely in order to avoid a sure disaster!

Jay thinks it is alright to suggest that, "yes someone is going to suffer from the consequences of drought years." He has stated "that we cannot afford to provide answers that will completely solve the water shortages we face". The real question is how can we afford NOT to provide a real solution? What is the accountability that state funded agencies have to the public when economies and natural systems are being overloaded and over appropriated by circumstances such as population growth, municipal demands, declining species habitat and lack of water storage facilities. Good money has been spent and years of effort have passed and the best the public can expect is: we cannot come up with good solutions? You fellows need to be realistic about the consequences of these band-aid fixes that do not offer solutions for the future of the Yakima River Basin. If you continue down the road you have established in your mind your mission is doomed for failure.

21-2 In fact your conclusions are not compatible with the mandate set down by congress with their authorization of the Feasibility Study in the first place. For you to ignore that and proceed with band-aid fixes is not the answer we need for the Yakima River Basin and leaves an ever greater burden for the coming generations to bear.

21-3 That is not to say that these band-aid fixes you have advocated should not happen over time. They may do some good but will never be a more lasting solution. Conservation from the day my family started irrigating the rich land in the Yakima Basin, has always been a part of our practices, just as it has with most farmers here in the basin. In fact in recent years those practices have accelerated not driven by DOE in the first place, but driven by farmers who in fact said it is time to do even more to clean the Yakima River up, as a prime example. And to their credit they did. I know exactly how this clean-up effort got started and succeeded and it sure as hell was not DOE that caused this to happen. In fact millions of dollars were spent by farmers to succeed with this effort that is ongoing even today. But the real fact is 'all the conservation practices in the world will not solve the water shortage problem in the Yakima River Basin', and you fellows know it! But as farmers we will and must continue to care for this precious resource water. But plants, trees and other species die without adequate water. In recent years huge losses to our agriculture economy were evident from the impacts of inadequate water. Still, despite these abundant losses we are without storage infrastructure in place that indeed helps fix the problem even though storage in the Yakima Basin is a need identified by massive studies conducted over the past several decades.

The Yakima Basin Storage Alliance caused monies to be appropriated with authorization by congress for the Feasibility Study to determine the most appropriate water storage solution in the Yakima River Basin. We have spent years as a voluntary citizens group pushing for additional storage to take care of all interests with enough viable wet water available to each interest. A lot of people have expended hundreds of hours pulling this idea together because we were told those are the steps that have to be taken first before we can get to storage. We made preliminary sacrifices and implemented conservation practices to show our good faith. In fact many farmers busted their butts spending millions of dollars to implement conservation practices to be credible voices of reason so we could get others to contribute according to their abilities so we could collectively find a water storage solution that would provide enough water to fix the problem. To get near the finish line and have a bail out comment like, "We cannot afford to provide answers that will completely solve the water shortages we face" is like a stab in the back.

21-3 I am sorry to say that from my humble point of view that the both of you have used the portion of the Feasibility Study funds to buy favor for your program doling out money to various interests....with the intent to develop support for your politically expedient ideas of a fix that is nothing short of being irresponsible. Certainly you can influence favor with funds and that is exactly what it appears you feel you have accomplished. I saw this early on and told you so a couple of years ago when Derek was at a YBSA meeting and Jay was parked along the road somewhere hooked into a conference call with us to discuss storage. The idea that you have bought time to implement your perception of solution as even more studies can be made appears to be the motive behind your efforts. 21-4 I wonder how many years you want to continue to study issues that have been studied to death now over many years! We need a bare minimum of an additional 600,000 acre feet of water for the Yakima Basin now for the Bureau to take care of the needs in this basin, including especially fish, plus municipal needs plus enough water for a 70% supply to junior water rights districts.

21-5 Where is the real water at in your plan? How much does it cost and how fast are you going to implement your fix? How much water is going to be made available for all interests how soon? Will your efforts really answer the responsibility if the Yakama Nation demands the treaty level numbers of fish at approximately 700,000 ? What are your public fish numbers anticipated by your plan? How do you assess the responsibility you should have to the public interests here in the Yakima River Basin such as: jobs; services; schools; towns; cities; counties; fish; families; recreation; value of life issues; in short the butcher, the baker and the candle-stick-maker; all interests inclusive of the Yakama Nation for the future of the Yakima River Basin? In short, you should recognize that we must have the ability water provides to have a healthy economy before we can provide for the healthy environment we all want here in this basin. Instead Jay talks about our ability to sustain our economy as something that is not in the cards today? He hides behind negative comments rather than face the future with the optimism that is the example of our forefathers in this basin across this country.

21-6 By the way when all of these different interests supported the idea of the feasibility study in the first place they expected to have the big fix in place. Signed resolutions by most of the towns, port districts, cities, various organizations and more important 40,000 people signed up for action not procrastination! These are all individuals who live and work here who

support the idea that it time for to take care of business now with a sense of urgency. Yet Jay tells us we have no support for our position? It seems that our constituents are tired of the delay and no action alternatives that the Department of Ecology supports in principle if not directly.

Yes we have those who continue, with the tired old story "as they have for years" as we have addressed so many conservation issues with success here in the Yakima Basin to say, "first you must use all the tools in the tool box before we build any new storage"! That continues to be their tired rhetoric without properly addressing the problem of required water into our water short basin. They are down to a screw-driver left in this tool box and are using it as a last ditch effort to cause disaster in the Yakima River Basin with support from the Department of Ecology. What a bunch of bunk, when it should not be the case today at all. What a travesty for this continued mentality to be accepted that leads us nowhere! We are running out of time for crying out load! Yes Derek you and Jay are manning the Screw-Driver now leaving your real responsibility to provide a real solution behind nonsense that will only lead to disaster here in the Yakima Basin. That is a sad omen of your work, when the tools are there to provide real solution with a lot more sense of urgency and understanding of the situation as it really exists. We are out of Water!

And while you are taking your time California starts to look north again to the Columbia River as their next source of Water. I guess that is okay with the department of Ecology to procrastinate for years until another state takes what we need to utilize... away from us. The signs are evident but are you paying any attention to them? More evidence of their interest in Columbia River water seems not to be much of a worry to you folks. Well it is too many of us! I see where the power lies today in congress and wonder just how long it will be before those states south of the Columbia can stand our remiss to not use this water before they come after it...with vigor. California is drying up and we expect them to not come after our water? Somebody has their head in the sand!

Those are my personal comments as requested by you Derek. I will include more drought pictures just to remind you that the disaster that will come from future drought years is clear in yours and Jays mind. It is important that your portrait of the future of our basin be imprinted on your minds as your legacy to our future. Is that really what you want?

Sincerely,
Tom Carpenter
Tom Carpenter

21-7 Addition: I enclose past drought pictures that include illustrations of damage caused by Drought here in the Yakima River Basin. These are real pictures of real damage that should not be ignored by anybody who is attempting to solve water shortages that are real in the Yakima River Basin! NO I do not believe Derek and Jay that you are really paying attention to the impact of drought that every forecast suggests will now come more often. Have you calculated what these droughts can cost in terms to loss of economy to the Yakima River Basin and the State? You should have and if you have show the people what the impact is in losses to our economy and fish that impact our entire state.

Comment Letter No. 21 – Tom Carpenter

21-1	Comments noted. Ecology believes that the Integrated Water Resource Management Alternative presented in this EIS is a positive step in improving water resources in the Yakima River basin and providing water for irrigation, future municipal growth, and fish.
21-2	See the response to Comment 7-3 regarding the qualitative nature of the goals of the Congressional authorization. Ecology does not consider the Integrated Water Resource Management Alternative to be a band-aid approach. It is a comprehensive approach to addressing the multiple water resource issues in the Yakima River basin and meeting the goals of the Congressional authorization.
21-3	Your comments regarding conservation are noted. Ecology agrees that conservation cannot provide water to meet all demands in the Yakima basin; however, there are additional improvements that can be made through conservation.
21-4	See the response to your Comment 21-2 regarding the 70 percent water supply.
21-5	Comments noted. Additional analysis has been provided in this Final EIS of the benefits to fish and water supply for the elements of the Integrated Water Resource Management Alternative. As noted in the Master Response, additional project-level analysis will be done on elements of the alternative as they are carried forward.
21-6	Comments noted. Ecology is not aware of new proposals to divert Columbia River water to California, although this concept has been proposed from time to time over the past 50 years. Any serious proposal to divert water out of the Columbia basin would require extensive environmental documentation and would have to meet Endangered Species Act requirements for stream flows to protect listed fish.
21-7	Ecology acknowledges the receipt of your photographs of drought impacts to fish and fruit trees. The photographs are not included in the Final EIS in the interest of saving space, but they are available for review at Ecology's Yakima Central Region Office.

Mr. Derek Sandison
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

Dear Mr. Sandison,

22-1 Thank you for the opportunity to comment on the "Draft Environmental Impact Statement" prepared by Department of Ecology as part of the Yakima River Basin Water Storage Feasibility Study prepared by the Bureau of Reclamation.

22-2 The Storage Study, as defined by Congress, asked the question is storage feasible to

1) Improve anadromous fish habitat by restoring the flow regimes of the Yakima and Naches Rivers to more closely resemble the natural hydrograph.
2) Improve the water supply for proratable (junior) irrigation entities by providing not less than 70% irrigation water supply for irrigation districts during dry years relying on diversions subject to proration.
3) Meet future municipal water supply needs by maintaining a full municipal water supply needs by existing users and providing additional surface water supply of 82,000 a/f.

The Study identified Black Rock Reservoir as the only alternative that will provide sufficient water to meet all the goals.

22-3 DOE's Draft has attempted to meet those goals by developing a package of projects to meet the future needs of the Yakima River Basin. Your proposed alternative will leave the basin woefully short of water during drought years.

22-4 The Integrated Water Resource Management Alternative is proposed to be implemented over a period of years depending on funding. Many of those identified are a continuation of the existing programs that have been funded over the past decade and have not produced any measurable amount of additional water.

22-5 The section on new or expanded storage reservoirs, which is the only part of the IWRMA that could provide some of the additional water needed during consecutive water short years. Identifying additional water from Bumping Lake enlargement as a possible solution misleads people to believe it is the answer to our problem and would solve our water needs. The expansion of Bumping Lake goes against all our environmental goals and does not provide the needed water. According to the tables D-1, 2, 3 (1981-2005) flow volumes into Bumping Lake range from a minimum of 103,000 a/f to a maximum 330,000 a/f. If you meet the instream flow requirement of 130 cfs and the higher flow targets in May-June, water available for storage would be a minimum 4,418 a/f to a maximum of 182,500 a/f annually. The additional water that might be available doesn't satisfy the amount needed during the second and third year of a drought cycle.

22-6 The other elements of the IWRMA program do not identify how much water would be saved or lost when the elements are implemented. How can opening up new floodplains and side channels be part of a water supply improvement and what happens when that habitat dry up every other year. Existing programs are already in place with funding from Title XII, Bonneville Power Administration, the Federal Government and the State to accomplish those enhancements when more water is available.

22-7 The cost/benefit ratio needs to be included in the IWRMA for each element. The $2,267,500,000 and unknown costs is a lot to pay for a program that could "provide greater opportunities", "may benefit", "best opportunity", "could be used", "varity of tools needed to meet their water supply needs and significantly improve fisheries" but does not identify how many fish could return to the Yakima River Basin, how much habitat could be made available without a large amount of new water and how much additional water would be needed to operate fish passage at existing reservoirs. 22-8 How can reconnecting and reestablishing floodplains and side channels occur when there is very little water available and no water during drought years?

22-9 Climate changes which are identified in the report to DOE from the Climate Impact Group at the University of Washington should be considered when proposing all the elements in the IWRMA especially the new and expanded storage options. With less snowpack and earlier runoff many of the elements will not produce enough water to benefit fish, agriculture, and municipal needs in the Yakima Basin.

22-10 Another need that is not identified in the IWRMA is meeting the Treaty Rights of the Yakama Nation. Additional water and management of the water by the Yakama's in the Yakima River is an important part of the solution.

22-11 Thank you for your work on the supplemental draft EIS for the Storage Study. The items identified are needed. They will all be viable when additional water for the Yakima River Basin becomes available with the implementation of Black Rock Reservoir as described in the Storage Study.

Sincerely,

Charles J Klarich

Chuck Klarich
1221 Blaine Rd.
Zillah, WA 98953

Comment Letter No. 22 – Charles Klarich

22-1	Comment noted.
22-2	See the response to Comment 21-2 regarding the goals included in the Congressional authorization for the Storage Study. Your comment in support of Black Rock reservoir is noted.
22-3	Comment noted.
22-4	Comment noted. As noted in the EIS, Ecology intends that the Integrated Water Resource Management Alternative will be implemented as an integrated package that will provide greater benefits than implementing any one element alone.
22-5	Comment noted. Additional analysis and modeling performed for the Bumping Lake enlargement are included in the Final EIS. That analysis reviews the potential reservoir yield and ability to supply water during an extended drought cycle.
22-6	Reconnecting floodplains and side channels is intended to improve habitat conditions for fish in the basin, one of the goals of the Storage Study. It is not necessarily intended to improve water supply.
22-7	See the Master Response regarding the programmatic nature of this EIS. Additional environmental and economic studies would be conducted in the future as elements of the Integrated Water Resource Management Alternative are carried forward.
22-8	See the response to your Comment 22-6. The water present in side channels does not affect river flow or water supply for other uses. The presence of water in side channels is dependent on their elevation relative to the river and to ground water levels.
22-9	See the response to Comment 9-2 regarding the update of the climate change section in this Final EIS.
22-10	The Yakama Nation has been involved in the development of the Integrated Water Resource Management Alternative and supports the alternative. See their Comment Letter Number 1.
22-11	Comment noted.

Comment Letter No. 23

-----Original Message-----
From: Walter Kloefkorn [mailto:wkloefkorn@yahoo.com]
Sent: Thursday, January 15, 2009 1:19 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

23-1 I am opposed to the construction of more irrigation dams in Washington.
I am especially opposed to any Bumping Lake Enlargement.

23-2 Please support water conservation alternatives and more in-stream flows for fish. Agriculture in Washington, particularly as practiced by those in the irrigation districts is extremely wasteful of water and energy.
To provide them additional subsidies before they even make an effort at conservation is outrageous.

23-3 I am a small farmer in Stevens County. I get no irrigation water from any dam. Farmers in Stevens County (where we get 20+ inches of rain a year) were put at a disadvantage by the state and federal governments subsidizing farmers elesewhere. Our agricultural economy has never recovered, although it is now starting to show signs it might. Don't derail our recovery by heaping additional, undeserved subsidies on water-wasteful farmers elsewhere.

The economic benefits of these huge public investments will flow to very few Washington farm families. Primarily, they will wind up in the coffers of large agribusiness corporations. Our rural communities will not be revitalized. Future energy price increases, which are sure to come, will threaten the viability of these investments. They should not be made as they are not a part of Washington's sustainable agriculture future, they are an attempt to deny the past and sacrifice the future.

Walter Kloefkorn
Higher Ground Organic Farm
Springdale, Washington

Comment Letter No. 23 – Walter Koefkorn

23-1	Your comment in opposition of dams is noted.
23-2	The Integrated Water Resource Management Alternative presented in this EIS includes elements for enhanced water conservation and additional stream flows for fish.
23-3	Your comments about subsidies are noted. Ecology intends that irrigation districts that benefit from any additional storage developed as a part of this proposal would pay the costs associated with that additional storage.

From: Laura Hendricks [mailto:laura.l.hendricks@gmail.com]
Sent: Friday, January 16, 2009 10:15 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

To: The Department of Ecology

Re: Yakima Supplemental Draft

24-1 Our organization is opposed to the construction of more irrigation dams in Washington. I am especially opposed to any Bumping Lake Enlargement. Please support water conservation alternatives and more in-stream flows for fish. With the severe reductions in fish populations in Washington, conservation efforts should be a high priority.

Sincerely,
Laura Hendricks
Coalition To Protect Puget Sound Habitat

Comment Letter No. 24 – Laura Hendricks

24-1	Your comment in opposition of dams is noted. The Integrated Water Resource Management Alternative presented in this EIS includes elements for enhanced water conservation and additional stream flows for fish.

From: Nick Gayeski [mailto:nick@wildfishconservancy.org]
Sent: Thursday, January 15, 2009 11:25 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

To Whom It May Concern,

25-1 I am opposed to the construction of more irrigation dams in Washington. I am especially opposed to any Bumping Lake Enlargement. Please support water conservation alternatives and more in-stream flows for fish.

25-2 I am also shocked at the inappropriately short duration for public comment, particularly in view of the recent whether conditions on both sides of the Cascades preceding and during the Holidays. This is a considerable disservice to the public process. Given appropriate time to review the voluminous documentation I could provide extensive comment on the proposal. The above few lines will have to suffice.

25-3 I have been involved in water conservation and storage issues, salmon and native trout recovery, and biological research in the upper Yakima and Naches River basins for over a decade. The environmental damage from an enlarged Bumping Reservoir will be huge and multi-faceted. Genuine water conservation, and retirement of inefficient farming operations, elimination of incentives and opportunities to spread water, mandatory metering of all water withdrawals and restriction of domestic well drilling, as well as the evaluation of delivery of Columbia River water to the basin, are all actions that should take precedence over any consideration to expand storage in the basin.

25-4 I would also like to hereby request a two month extension of the current public comment period.

Nick Gayeski
Conservation Ecologist
Wild Fish Conservancy
425-788-1167; ext. 225

Comment Letter No. 25 – Nick Gayeski, Wild Fish Conservancy

25-1	See the response to Comment 24-1.
25-2	The comment period on the Supplemental Draft EIS was from December 10 to January 16. The standard comment period for a Draft EIS is 30 days. Because of the holidays during the comment period, Ecology allowed additional days for commenting. Ecology does not believe that any additional time extension was justified.
25-3	Your comments are noted.
25-4	See the response to your Comment 25-2.

From: Paul Andrews [mailto:paul@paulandrews.com]
Sent: Thursday, January 15, 2009 2:00 PM
To: Sandison, Derek (ECY)
Subject: Yakima supplemental draft

26-1 It's time for CHANGE in America, and you can help create a new tomorrow under the Obama administration's mandate.

Please register me as opposed to the construction of more irrigation dams in Eastern Washington. In particular, I am especially opposed to any Bumping Lake Enlargement.

It's time to support water conservation alternatives and more in-stream flows for fish. Please help save our planet for our children.

Regards,
Paul Andrews

Comment Letter No. 26 – Paul Andrews

26-1	See the response to Comment 24-1.

-----Original Message-----
From: frankbackus@comcast.net [mailto:frankbackus@comcast.net]
Sent: Friday, January 16, 2009 10:03 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplimental Draft

27-1 I am opposed to the construction of more irrigation dams in Washington.
I am especially opposed to any Bumping Lake Enlargment, which would flood out old growth next to the William O. Douglas Wilderness Area.
See: http://www.ecy.wa.gov/programs/wr/cwp/cr_yak_storage.html

Sincerely,

Frank I. Backus, MD
12737 20th Ave NE
Seattle, WA 98125-4118
frankbackus@comcast.net

Comment Letter No. 27 – Frank Backus

27-1	See the response to Comment 24-1.

From: Janine Blaeloch [mailto:blaeloch@westernlands.org]
Sent: Thursday, January 15, 2009 10:05 AM
To: Sandison, Derek (ECY)
Subject: opposition to irrigation dam development

28-1 As a member of CELP, an environmental activist, and fifth-generation Washingtonian, I want to voice my strong opposition to any further development of irrigation dams in our state. I am particularly concerned about the Bumping Lake enlargement, which apparently would inundate native old-growth forest.

We need water for fish and instream flows--we cannot allow agribusiness to continue to claim vast amounts of this precious resource at the expense of our ecological and cultural well-being.

Thank you for your consideration.

Janine

Janine Blaeloch, Director
Western Lands Project
PO Box 95545 Seattle, 98145
ph 206.325.3503
fx 206.325.3515

Comment Letter No. 28 – Janine Blaeloch, Western Lands Project

28-1	See the response to Comment 24-1.

-----Original Message-----
From: T Doan [mailto:tedoan@sounddsl.com]
Sent: Thursday, January 15, 2009 11:44 AM
To: Sandison, Derek (ECY)
Cc: john osborn
Subject: Yakima Supplemental Draft

29-1 All water use needs to be measured to control waste and water pollution. I consider subsidizing irrigation at the expense of other environmental concerns to be a flagrant waste of every resource involved, including financial.

More to the particular point being considered, I oppose the construction of more irrigation dams in Washington and am especially opposed to any Bumping Lake Enlargement.

Please support water conservation alternatives and more in-stream flows for fish.

Sincerely,
T. Doan
Bainbridge Island, WA

Comment Letter No. 29 – T. Doan

29-1	See the response to Comment 24-1.

-----Original Message-----
From: Michael Ewald [mailto:michael.ewald@comcast.net]
Sent: Thursday, January 15, 2009 3:15 PM
To: Sandison, Derek (ECY)
Subject: Irrigation Dams and Bumping Lake

Ecology,

30-1 Bumping Lake dam should not be expanded. I am opposed to the construction of more irrigation dams in Washington because much of the flow can be "created" from increased efficiency projects and education of water users within the basin. Using these techniques does not alter the landscape, water rights, costs less, and maintains instream flows.

Thanks,
Michael Ewald

Comment Letter No. 30 – Michael Ewald

30-1	See the response to Comment 24-1.

From: Shaun McHenry [mailto:smchenry@mountaingear.com]
Sent: Saturday, January 17, 2009 12:51 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

I think that history has already shown us that building more dams is only a short term fix. When water becomes more scarce, what then? When more land is rendered unusable as a result of outdated methods, what then?

31-1 Don't you think that lessening the amount of trees that can help to clean the air might have the opposite effect of helping the planet? I sincerely hope that we can try and come up with better alternatives to building more dams or expanding existing ones. Rather than destroy the world, why don't we try to adapt to it?

I am opposed to the construction of more irrigation dams in Washington. I am especially opposed to any Bumping Lake Enlargement. Please support water conservation alternatives and more in-stream flows for fish

Comment Letter No. 31 – Shaun McHenry

31-1	Your comments are noted. See the response to Comment 24-1 regarding the expansion of Bumping Lake, conservation, and instream flows.

From: Bill McMillan [mailto:monksend@fidalgo.net]
Sent: Thursday, January 15, 2009 12:35 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

Dear Mr. Sandison:

32-1 I am opposed to the construction of more irrigation dams in Washington. I am especially opposed to any Bumping Lake Enlargement. Please support water conservation alternatives and more in-stream flows for fish. In the face of climate change, Washington's water future rests with sensible, sustainable, and affordable water solutions -- not more dams.

Sincerely,

Bill McMillan
40104 Savage Rd.
Concrete, WA 98237
(360) 826-4235
monksend@fidalgo.net

Comment Letter No. 32 – Bill McMillan

32-1	See the response to Comment 24-1.

From: stanmaggie@comcast.net [mailto:stanmaggie@comcast.net]
Sent: Friday, January 16, 2009 10:04 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

33-1 As someone who enjoys the outdoors and especially the Bumping Lake area for camping, I am voicing my opposition to any Bumping Lake Enlargement and, in general, the construction of more irrigation dams in Washington. Please support water conservation alternatives and more in-stream flows for fish.

Stan Moffett
11752 Palatine Ave. North
Seattle, WA 98133

Comment Letter No. 33 – Stan Moffett

33-1	See the response to Comment 24-1.

From: Bobbie Morgan [mailto:morgan.bobbie@gmail.com]
Sent: Thursday, January 15, 2009 12:19 PM
To: Sandison, Derek (ECY)
Subject: Bumping Lake

34-1 Please do not allow expansion of dams that impact old growth forest lands, in particular Bumping Lake. I urge you to support restoration of natural habitat in streams and watersheds, especially to protect or enhance in stream flows for fish.

B. Morgan
978 Aaron Avenue
Bainbridge Island, WA
--

"We are like tenant farmers chopping down the fence around our house for fuel when we should be using Nature's inexhaustible sources of energy—sun, wind and tide. I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that."
- Thomas Edison, shortly before he died in 1931, in a conversation with Henry Ford and Harvey Firestone

Comment Letter No. 34 – Bobbie Morgan

34-1	See the response to Comment 24-1.

Comment Letter No. 35

From: Annemosness@aol.com [mailto:Annemosness@aol.com]
Sent: Friday, January 16, 2009 12:49 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

Washington Dept of Ecology
To whom it may concern

35-1 This email is being sent so my name can be added to those opposed to the construction of more irrigation dams in Washington, particularly the Bumping Lake Enlargement. As a longtime commercial fisherwoman and wild salmon advocate, I believe it is absolutely crucial that we value wild fish and businesses that depend upon them as much as we value other food producers. As well, wild salmon are essential components of our coastal ecosystems so it is imperative for agencies that have responsibility for management and protection of wild salmon to ensure they have enough cool, free-flowing water as they leave and return from sea.

Thank you,
Anne Mosness
Bellingham, Wa.

Comment Letter No. 35 – Anne Mosness

35-1	Your comments in opposition to more irrigation dams are noted. The Integrated Water Resource Management Alternative presented in this EIS includes fish passage, fish habitat enhancements, and increased stream flows to benefit salmon.

From: Potter, Donald [mailto:potter.d@ghc.org]
Sent: Friday, January 16, 2009 9:39 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

16 January 2009

Department of Ecology
State of Washington

Gentlemen and Ladies

36-1 Please let my opposition be entered to massive new dam irrigation projects for eastern Washington. In particular, I would oppose enlarging Bumping Lake. I have studied the aerial view of a larger lake, and note per the BuRec FPR/EIS that a new reservoir would flood approximately 1,900 acres of old-growth timber. I think the loss of this amount of growth would disrupt the local habitat, and is an unnecessary action.

36-2 Further, I would encourage Ecology and the Governor to consider adding nearby areas to the William O. Douglas Wilderness, by re-delineating the Wilderness boundary down to the existing reservoir.

Thank you

DE Potter, MD
3823 140th Avenue NE
Bellevue, WA 98005

Comment Letter No. 36 – Donald Potter

36-1	Your comments opposing the expansion of Bumping Lake reservoir are noted.
36-2	Expanding the William O. Douglas Wilderness Area would require an act of Congress and is outside the authority of Ecology and the Governor.

From: K Russel [mailto:needtoknow1@gmail.com]
Sent: Friday, January 16, 2009 10:22 AM
To: Sandison, Derek (ECY)
Subject: Yakima supplemental draft

37-1 I oppose more irrigation dams in Washington. Bumping Lake Enlargement may create tourism or whatever it is supposed to do for whomever, but what I see is lack of foresight, capital trying to eat up more water instead of conserving. Long term effects and loss of in-stream flow for fish, not good.

37-2 Irrigate what - Monsanto corn for cars, monocrops, unsustainability. Even for barley. Don't keep doing this.

It is not too late to do the right thing.

Comment Letter No. 37 – K Russel

37-1	Your comments opposing expansion of Bumping Lake reservoir are noted. The Integrated Water Resource Management Alternative described in this EIS includes water conservation and increased flows for fish.
37-2	As described in Section 1.3.1 of this Final EIS and in Sections 4.14 and 4.15 of the January 2008 Draft Planning Report and EIS, irrigation in the Yakima River basin supports a variety of high-value crops such as orchard crops, wine grapes, hops, grains, vegetables, and dairy products. The basin does not grow significant amounts of corn for ethanol.

From: FStruck@aol.com [mailto:FStruck@aol.com]
Sent: Friday, January 16, 2009 10:09 PM
To: Sandison, Derek (ECY)
Subject: Dams in Washington

38-1 I think we need to find how to decrease the number of dams in Washington rather than build more. Water needs to flow naturally if we are to prevent further deterioration of our natural resources. Especially the Bumping Lake Enlargement is unwise for our state. It may have temporary benefits for a very few individuals but it's not in the State's best interest.

By the way, I had a conversation with William O Douglas in about 1963.

Fred Struck

Comment Letter No. 38 – Fred Struck

38-1	Your comments opposing expansion of Bumping Lake reservoir are noted.

From: Meghan Tierney [mailto:gogomegs@hotmail.com]
Sent: Saturday, January 17, 2009 10:05 AM
To: Sandison, Derek (ECY)
Subject: Bumping Lake Enlargement

39-1 I am writing in concern over the Bumping Lake Enlargement. From the soil to wildlife, old growth is a vital component in the overall ecosystem and once it is gone, it's gone. Please reconsider the impact of a dam on Bumping Lake. We have visited the area since I was young and it would be devastating to witness the destruction of yet another dam. Old growth should be cherished not only due to it's beauty, but the role that it plays in the web of nature.

Sincerely,

Meghan Tierney-Knight
425 466 5197

Comment Letter No. 39 – Meghan Tierney-Knight

39-1	Your comments opposing expansion of Bumping Lake reservoir are noted.

-----Original Message-----
From: Bookmaster [mailto:bookmasterjt@yahoo.com]
Sent: Thursday, January 15, 2009 6:30 PM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

Dear sir,

Irrigation water has assumed an importance "way out of line" with other water uses and needs in Washington.

I oppose any more irrigation dams in Washington!!!!

40-1 Please support water conservation alternatives and more in-stream flows for fish. This is of much more importance to the well-being of ALL of the citizens versus a few rich farmers!!!

I am especially opposed to any Bumping Lake Enlargement. This is unnecessary adn counter-productive for future needs.

Thank you for your consideration.

Best Regards,

John townsell
5408 Rockefeller Ave.
Everett, WA 98203

Comment Letter No. 40 – John Townsell

40-1	See the response to Comment 24-1.

From: Wayne Ude [mailto:ude@whidbey.com]
Sent: Thursday, January 15, 2009 10:20 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

41-1 I'm dismayed that at this point in our history you would propose additional irrigation dams. We need water conservation to support better in-stream flows for fish, not a Bumping Lake Enlargement.

Yours,

Wayne Ude
Clinton, WA

Comment Letter No. 41 – Wayne Ude

41-1	See the response to Comment 24-1.

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-----Original Message-----
From: Ken and Jocelyn Weeks [mailto:kjweeks@embarqmail.com]
Sent: Thursday, January 15, 2009 1:52 PM
To: Sandison, Derek (ECY)
Subject: no more irrigation dams
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42-1 Greetings: think conservation and new ways to use less water in this state and not more dams. They invariably run over in cost projections and they favor agribusiness over other values....so much more efficient water use is I think, the cheapest and wisest way to make water go farther. Sincerely Ken Weeks

Comment Letter No. 42 – Ken Weeks

42-1	See the response to Comment 24-1.

From: Emily Crandall [mailto:crandall@westernlands.org]
Sent: Thursday, January 15, 2009 11:00 AM
To: Sandison, Derek (ECY)
Subject: Yakima Supplemental Draft

43-1 I am writing to express my opposition to the construction of more irrigation dams in Washington, particularly any Bumping Lake Enlargement.

Please support water conservation alternatives and more in-stream flows for fish.

Thank you,
Emily Crandall

Emily Crandall, Development Manager
Western Lands Project
PO Box 95545 Seattle, WA 98145-2545
ph 206.325.3503
fx 206.325.3515
www.westernlands.org

Western Lands Project monitors and scrutinizes federal land transactions across the West and beyond- including land exchanges, sales and even outright giveaways of public land- and their impacts on ecosystems, resources, land use, communities and habitat.

Comment Letter No. 43 – Emily Crandall

43-1	See the response to Comment 24-1.

From: Steve Zemke [mailto:stevezemke@msn.com]
Sent: Thursday, January 15, 2009 10:25 AM
To: Sandison, Derek (ECY)
Subject: FW: Yakima Supplemental Draft

44-1 I am opposed to enlarging Bumping Lake next to the William O Douglas Wilderness Area. Rather than constructing more dams and enlarging existing dams to flood more areas for irrigation in eastern Washington, please put more emphasis on better management of existing resources by looking for ways to more efficiently use existing water resources. Water is a finite resource and a limiting factor in land use and fish management decisions.

Steve Zemke
2131 N 132nd St
Seattle, WA 98133

Please keep me informed of your decisions on this matter. Thank you.

Comment Letter No. 44 – Steve Zemke

44-1	See the response to Comment 24-1.

The following email message was received from the individuals listed below the message:

45-1 I am opposed to the construction of more irrigation dams in Eastern Washington. I am especially opposed to any Bumping Lake Enlargement. Please support water conservation alternatives and more in-stream flows for fish.

Ellie Belew
brooke@raincity.com
Robin Dean
Jim Eberhardt
Karen H. Edwards
Connie Fukudome
David Gordon
Jason Hardy
Wade Higgins
Anne Johnson
Mary Kunkel
Dianna Larson
Carl Lind
Alerian Lockwood
Rhonda Murphy
Judy Noll
Elaine Packard
Robert Pauw
Gibbs Houston Pauw
Tom Putnam
Dick Rieman
Greta M. Rizzuti
Nancy Rust
W. Thomas Soeldner
Devin Smith
Alan H. Taylor
Julie Titone

Comment Letter No. 45 – Email sent by 27 individuals

45-1	The receipt of emails sent by the 27 individuals listed is noted. See the response to Comment 24-1.

CHAPTER 7.0 REFERENCES

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CHAPTER 8.0 DISTRIBUTION LIST

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United States Senate

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Honorable Patty Murray

House of Representatives

Honorable Doc Hastings

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Honorable Christine Gregoire

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Confederated Tribes and Bands of the Yakama Nation, Toppenish, Yakima
Confederated Tribes of the Umatilla Reservation, Pendleton, OR
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Representative Bill Hinkle, Ellensburg, Olympia
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14th Legislative District

Senator Curtis King, Yakima, Olympia
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- Hanford Site
  - Office of River Protection, Richland
  - Richland Operations Office, Richland
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Department of Commerce
- National Oceanic and Atmospheric Administration
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Department of the Interior
- Fish and Wildlife Service, Yakima
- Bureau of Indian Affairs, Northwest Regional Office, Portland

Environmental Protection Agency, Seattle

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State of Washington

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Department of Ecology, Olympia, Yakima
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Department of Natural Resources, Ellensburg, Olympia
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- Commissioners, Ellensburg

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Yakima County
- Commissioners, Yakima
- Surface Water Management, Yakima

Yakima Regional Clean Air Authority, Yakima

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Cascade Irrigation District, Ellensburg
Kennewick Irrigation District, Kennewick
Naches-Selah Irrigation District, Selah
Roza Irrigation District, Sunnyside
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Columbia River Intertribal Fish Commission, Portland OR
Desert Aire Owners Association, Desert Aire
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League of Women Voters of Yakima County, Yakima
Lower Columbia Audubon Society, Richland
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Washington Environmental Council, Seattle
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Yakima Basin Storage Alliance, Zillah
Yakima Basin Water Resource Agency, Yakima
Yakima Valley Audubon Society, Yakima
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HDR Engineering, Tri Cities
Jacobs Associates, Seattle
MSE-Tech Applications, Richland
Petkevicius and Associates, Kennewick
Rettig Osborne and Forgette LLP, Kennewick
Schwisow and Associates, Olympia
Science Applications International Corp, Richland
The Williams Law Firm, Bellevue
TRIDEC, Kennewick
URS Corporation, Portland, OR
Wautoma Valley LLC, Yakima

Appendix A.
Summary of Scoping Comments

Comment Summary
Address the need for both additional out-of-stream water supply and the needs of aquatic resources (including correcting instream flow problems, protecting and restoring habitat, and restoring fish passage into historic habitat).
Consider the impacts of the components of the package cumulatively.
Storage elements should assume a portion of new stored water would be available for fishery purposes at the discretion of the Yakama Nation.
The 70% proratable supply standard for success/failure should not be applied in this analysis.
All structural alternatives require a thorough assessment of cultural resources, wildlife, and other resources within the footprint of the reservoirs and other facilities.
Consider a prioritized package of components for the project (list submitted).
Raising the pool's elevation would flood considerable forest area, removing wildlife habitat.
Expansion area has a high potential for the presence of rare plants and plant communities.
Consider impacts on historic and prehistoric cultural properties.
Facilities, improvements, and roads are within the footprint of the Bumping Lake expansion, or would have their access cut off by the lake.
Fish passage alternative: effective upstream fish passage should be permanently established at Clear Lake Dam.
Potential water supply: install pump facility at Kachess Lake.
Look at the Yakima River watershed in its entirety and consider a suite of actions that can restore watershed processes.
Instream flow improvement to key tributaries should be part of the discussion.
Recognize the benefits of increased flows for fish in the Yakima Basin.
Fish Passage Improvements, Bumping Lake: Address bull trout impacts and terrestrial impacts, including impacts to spotted owls.
Address winter habitat conditions.
Address the timing, temperature, and rate of flow change (ramping) aspects of connectivity.
The DSS model could be used as a tool to refine and prioritize where floodplain connectivity would result in the greatest fish benefit or incorporate modifications to the set that are proposed. Gaming the model would highlight which restoration alternatives resulted in greatest production.
Include information from technical reports and other documents and models to support conclusions rather than inclusion by reference.
Expand benefit analysis to quantify the synergistic benefits to on-going habitat protection and restoration projects.

Comment Summary
When calculating anadromous and resident fish benefits, address the following: • Include sockeye salmon in the benefits analysis; • Include use values for wild and hatchery Yakima steelhead in the benefit analysis; • Calculate use values for non-listed resident fish species in the benefit analysis; • Include "non-use" (non-consumptive) values for both anadromous and resident fish in the benefit analysis.
Look comprehensively at the river system, taking account of the seven major issue findings in the "Reaches Project" report
Land use planning, designation, and zoning are the jurisdiction of the local governments, not of the State.
A scoping meeting should be held in Richland, Kennewick, or Prosser.
The Lower Basin should be considered for on-the-ground water quality, water quantity, and habitat enhancements.
Change the term "modifying floodplains" to "reconnecting and restoring floodplains."
Consider combinations of alternatives in the context of each other and existing policy guidance.
Establish economic water supply reliability and habitat joint values, wants, needs, and priorities for the many basin interests through a collaborative process.
Include fish goals, a procedure, or criteria for assessment.
Address the drought resistance impacts analysis resulting from climate change.
It is important to provide specific restoration and water supply goals, and then develop transparent criteria/rationale for prioritizing options.
Need criteria for higher priority existing structures.
Pay attention to bull trout.
Access several iterations of the RiverWare software to test prime or suggested alternatives.
Include reasonably foreseeable actions by YRBWEP and YP BiOp in all alternatives.
Include bypass canal relative to Spring Chinook spawning in the Upper Yakima River.
Include special emphasis on flip-flop revisions or removal.
Include Naches tributaries on the list of tributary enhancements, including Tieton, Little Naches, Rattlesnake, Cowiche.
Include the Upper Naches reach on the list of mainstream enhancements
Include conservation planning on the already publicly owned and managed properties and conservation future. Lots of folks are willing to preserve functional habitat floodplains, not a lot are willing to actively restore degraded floodplains. Need to identify possible sponsors for floodplain restoration in Kittitas and Benton Counties, and reasonably foreseeable floodplain restoration actions in the basin. Should include Bark Ranch/West Richland in reaches (possibly in association with KID pumps).
Language on major issues to be considered should include flood flows and floodplain restoration and connectivity. Wildlife should have special emphasis on listed species.

Comment Summary
Legal restrictions on goals and objectives of the study were severely restricted from the start. Scope of actions and alternatives should be broadened.
Fish ladders need additional water.
Consideration needs to be given to the amount of habitat above the existing reservoirs.
Will climate change, and the possible change in the timing of runoff, have an affect on the reservoirs?
Storage/Modification to existing facilities and operation has been reviewed many times.
The review needs to evaluate how much new water would be available and how many fish would be credited to that habitat. What is the cost/benefit ratio?
Existing programs and projects that have been completed on tributaries need to be identified. Title XII money is available for tributary enhancements.
Use the 2004 Yakima Subbasin Plan, the 2005 Yakima Subbasin Salmon Recovery Plan, and the Yakima Steelhead Recovery Plan as guides to identify actions to be assessed in the supplemental EIS and to assess the impacts of assessed actions in the broader context of ongoing fish habitat improvement efforts in the basin. (Submitted summary of actions from these plans).
Look at the effect of fish passage and habitat restoration projects when combined with each other and with the enhanced conservation/efficiency and water market alternatives discussed in the draft EIS released last January.
Construction of new storage should not be seriously considered unless it appears that a package of less expensive, less environmentally harmful alternatives is not capable of sustaining healthy salmon and steelhead populations or providing reasonable improvements in the reliability of the Yakima Basin's water supply.
Apply a litmus test in deciding which potential water supply and habitat improvement projects will be the subject of the SEIS. The test should include realistic, up-front analysis of the costs of the project, as well as analysis of who will pay. Infrastructure projects should be able to demonstrate real and substantial fish and aquatic habitat benefits.
Remove two unaffordable and non-sustainable infrastructure projects from consideration: the Wymer Dam project modifications and the Bumping Lake enlargement.
Analyze a pricing program as part of the SEIS analysis of water supply alternatives.
Analyze the benefits of implementing a water piping and pressurization system for the basin irrigation districts.
Analyze the benefits of amending water transfer laws and procedures to allow irrigation district members to freely transfer their rights.
Adopt a wide scope of study for habitat improvements for fisheries.
The public notice for scoping opportunity was inadequate.
Black Rock Reservoir will cost too much.
A more detailed analysis is needed (suggestions more appropriate to a project-level EIS were given).

Comment Summary
Commenter is in support of Wymer Reservoir, additional storage at Bumping Lake, raising of Cle Elum lake, a pipeline from Lake Kachess to Lake Keechelus, and a pump station at Price Rapids Dam.
Too many studies. Expand holding basins. Fish passage is possible in existing dams.
Project has been a waste of taxpayer money. Commenter is opposed to Black Rock Dam; in support of expanding Bumping Lake and Rim Rock Lake.
Evaluate pressurizing all irrigation systems and converting most irrigation practices to drip irrigation.
The EIS must have an aggressive conservation alternative.
Look at multiple alternatives to the present situation.
The figure for the cost of additional instream water at Parker is misleading. A careful analysis should indicate a significantly lower cost for gains in instream flows.
More consideration should be given to water transfers, including systematic land fallow with associated water transfers on a temporary or permanent basis.
Look at storage in Kittitas County: Manastash, Taneum, Nanaeum, Teanaway and others.
Commenter is in opposition to the Black Rock alternative.
Find an ecologically sound approach that makes economic sense.
Conservation of existing water sources should be the first priority.
The supplemental processes should mimic natural processes.
Improve habitat.
Be mindful of the future of both fish and agriculture.
Make use of water released form Rimrock Lake. Look at how we manage Lakes Cle Elum, Kachess, and Keechelus. They may provide additional water during the dry years.
Build a dam on Lmuma Creek similar to the Black Rock dam. It could possibly include a salmon hatchery.
Add catch basins.
Improve the water distribution system in the Kittitas Valley. Replace the KRD's open canals with fully metered pressurized pipe all the way from Lake Easton to the end of the system.
Commenter in support of Black Rock Reservoir. Worried about implications of no action.
Aquifer system recharge is an inadequate solution to this problem. Conservation is inadequate to meet the needs of the environment, fish, and irrigation. Need a secure supply of water.
Commenter suggested an alternative for storage in the Kittitas Basin: a series of small off-stream ponds along Taneum creek to hold spring high flows.
Look at upgrades to the existing irrigation systems and a change in law (when landowners subdivide their property, assign a state water right to the water "lost" to the acreage covered by roads and roofs).
Black Rock is too expensive. Find a solution without pumping water.

Appendix B.
Special Status Species Tables

Table B-1. Special Status Species in the Vicinity of the Individual Elements Proposed in the Yakima River Basin Water Storage Feasibility Study SEIS

	Yakima River (main stem)	Keechelus Lake	Kachess Lake	Cle Elum Lake	Naches River (main stem)	Bumping Lake	Rimrock Lake	**Naches River Tributaries**	Bumping River	Tieton River	**Yakima River Tributaries**	Cle Elum River	Kachess River	Big Creek	Teanaway River	Swauk Creek	Taneum Creek	Manastash Creek	Naneum Creek	Ahtanum Creek	Toppenish Creek	Satus Creek	Cowiche Creek
PRIORITY SPECIES																							
Mammals																							
Gray wolf (*Canis lupus*); SE, FE		X	X				X																
Wolverine (*Gulo gulo*); SCAN, FSOC			X			X																	
Lynx (*Lynx canadensis*); ST, FT						X			X														
Marten (*Martes americana*); SNONE, FNONE							X			X													
Fisher (*Martes pennanti*) SE, FCAN																X							
Western gray squirrel (*Sciurus griseus*); ST, FSOC										X											X	X	
Townsend's ground squirrel (*Spermophilus townsendii*); SCAN, FSOC	X																						
Grizzly bear (*Ursus arctos*); SE, FT			X	X									X			X							
Reptiles and Amphibians																							
Western toad (*Bufo boreas*); SCAN, FSOC		X				X	X												X				
Sharptail snake (*Contia tenuis*); SCAN, FSOC	X																						
Larch mountain salamander (*Plethodon larselli*); SSEN, FSOC			X	X																			
Columbia spotted frog (*Rana luteiventris*); SCAN, FNONE	X						X									X							
Birds																							
Northern Goshawk (*Accipiter gentilis*); SCAN, FSOC		X	X	X	X	X	X		X	X			X	X		X			X				
Golden eagle (*Aquila chrysaetos*); SCAN, FNONE	X									X													
Great blue heron (*Ardea herodias*); SNONE, FNONE	X		X										X		X						X		
Vaux's swift (*Chaetura vauxi*); SCAN, FNONE																			X				
Pileated woodpecker (*Dryocopus pileatus*); SCAN, FNONE							X									X							
Merlin (*Falco columbarius*); SCAN, FNONE				X												X							
Prairie falcon (*Falco mexicanus*); SNONE, FNONE	X						X			X						X							
Peregrine falcon (*Falco peregrinus*); SSEN, FSOC					X		X																
Common loon (*Gavia immer*); SSEN, FNONE					X	X																	
Bald eagle (*Haliaeetus leucocephalus*); SSEN, FSOC	X			X			X					X								X			
Harlequin duck (*Histrionicus histrionicus*); SNONE, FNONE					X					X		X											

Table B-1. Special Status Species in the Vicinity of the Individual Elements Proposed in the Yakima River Basin Water Storage Feasibility Study SEIS

Lewis' woodpecker (*Melanerpes lewis)*; SCAN, FNONE									X												
Black-crowned night-heron (*Nycticorax nycticorax)*; SNONE, FNONE	X																				
Mountain quail (*Oreortyx pictus)*; SNONE, FNONE			X													X					
White-headed woodpecker (*Picoides albolarvatus)*; SCAN, FNONE							X		X												
Black-backed woodpecker (*Picoides arcticus)*; SCAN, FNONE													X								
Spotted owl (*Strix occidentalis)*; SE, FT		X	X	X		X	X	X		X		X		X							
Plants																					
Tall agoseris (*Agoseris elata*); SS, FNONE																	X				
Pauper milkvetch (*Astragalus misellus* var *pauper*); SS, FNONE	X																				
Ahtiana pallidula (*Ahtiana pallidula*)														X							
Fewflower sedge (*Carex pauciflora*); SS, FS		X																			
Thompson's pincushion (*Chaenactis thompsonii*); SS, FNONE				X						X											
Gray cryptantha (*Cryptantha leucophaea*); SS, FSOC	X																				
Clustered lady's slipper (*Cypripedium fasciculatum*); SS, FSOC				X								X		X							
Basalt daisy (*Erigeron basalticus*); ST, FSOC	X																				
Piper's fleabane (*Erigeron piperianus*); SS, FNONE	X				X																
Swamp douglasiana (*Gentiana douglasiana*); SS, FNONE		X																			
Oregon false goldenaster (*Heterotheca oregona*); ST, FNONE								X													
Longsepal wild hollyhock (*Iliamna longisepala*); SS, FNONE																	X				
Hoover's desertparsley (*Lomatium tuberosum*); SS; FSOC	X																				
Coyote tobacco (*Nicotiana attenuate*); SS, FNONE																				X	
Small phacelia (*Phacelia minutissima*); SE, FSOC																	X				
Tacky goldenweed (*Pyrrocoma hirta* var *sonchifolia*); SS, FNONE																	X				
Oregon white oak (*Quercus garryana*)														X							
Mountain blue-eyed grass (*Sisyrinchium sarmentosum*); ST, FSOC						X	X														
Creamy lady's tresses (*Spiranthes porrifolia*); SS, FNONE			X																		
American waterawlwort (*Subularia aquatica* var *americana*); SR1, FNONE			X								X										
Hoover's umbrellawort (*Tauschia hooveri*); ST, FSOC																					X
PRIORITY HABITAT TYPES																					
Bald eagle	X		X						X		X										X
Burrowing owl	X																				
Big game			X	X																	
Big horn sheep					X											X					
Cliffs/Bluffs	X	X	X	X	X		X	X	X		X			X		X	X				
Elk	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X			
Ferruginous hawk	X																				

Table B-1. Special Status Species in the Vicinity of the Individual Elements Proposed in the Yakima River Basin Water Storage Feasibility Study SEIS

Golden eagle	X								X												
Great blue heron	X																			X	
Harlequin duck									X												
Mountain goat		X	X	X		X	X			X	X										
Mule and Black-tailed deer	X				X				X				X	X		X		X			
Mule deer	X						X							X			X				
Oak woodlands	X								X					X							
Old Growth		X						X		X											
Riparian Zones	X		X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X
Rocky mountain big horn sheep	X				X				X												
Rocky mountain elk							X	X	X								X				
Rural Natural Open Space	X																				
Sharptail snake	X																				
Shrub-steppe	X																				
Spotted Owl Critical Habitat		X	X	X		X	X	X	X	X	X			X	X		X				
Talus slopes					X	X	X	X													
Urban Natural Open Space	X				X											X					X
Waterfowl concentrations	X						X														
Wetlands	X	X	X	X	X	X	X	X					X								
White-tailed deer				X																	
Wood duck	X				X				X	X			X								X

Sources: **USFWS, 2008; WDFW PHS database information September 2007; and, WDNR NHP database information April 2008**

Legend

FE=Federally endangered
FT=Federally threatened
FCAN=Federal candidate species
FS=Federal sensitive species
FSOC=Federal species of concern
FNONE=No listing

SE=State endangered
ST=State threatened
SCAN=State candidate species
SS=State sensitive species
SSOC=State species of concern
SNONE=No listing
SR1=Review group 1. Of potential concern but needs more field work to assign another rank.

Appendix C.
Fish and Fish Habitat Tables

Table C-1
Upstream Extent of Anadromous Salmonid Passage in the Affected Area

Stream	Upstream Extent
Naches River Tributaries	
Bumping River	To Bumping Dam; otherwise, upstream at natural falls
Tieton River	To Tieton Dam; otherwise, entire mainstem; North Fork Tieton to RM 17.40 at toe of alluvial fan.
Yakima River Tributaries	
Cle Elum River	To Cle Elum Dam; otherwise, RM 9 at natural steep cascades
Keechelus River	To Keechelus River; otherwise, none on mainstem
Kachess River	To Kachess Dam; otherwise, none on mainstem
Teanaway River	Entire mainstem
Swauk Creek	Entire creek
Taneum Creek	To RM 2.0 at Bruton Diversion* (provides partial passage)
Jack Creek	To culvert near stream mouth*
Indian Creek	To culvert near stream mouth*
Manastash Creek	To RM 1.6 at barrier at West Side Canal
Naneum Creek	To barrier close to mouth
Reecer Creek	To 100 feet upstream of mouth of stream at diversion; also, in winter, the alluvial fan reach of the creek dries and prevents upstream winter movement by parr and sub-adults.
Wilson/Naneum Creeks Systems[1]	To RM 1.9 at irrigation diversion barrier Cherry Creek: To within 1-2 miles of Wilson Creek confluence at diversion Coleman Creek: To 0.5 mile upstream of Naneum Creek confluence at diversion
Ahtanum Creek[2]	To RM 8.0 at Wapato Irrigation Project Diversion near Tampico Wide Hollow Creek: RM 0.6 at old mill dam (adults can pass)
Toppenish Creek	To RM 4.8 at Durham Diversion
Cowiche Creek	Entire mainstem (partial barriers do exist)
Little Naches River	Entire mainstem

Table Notes:

* May not be completely impassable barrier, but extremely difficult fish passage.

[1] Includes Wilson, Naneum, Coleman, and Cherry Creeks, which are all interconnected.

[2] Includes North and South Forks and Wide Hollow Creek.

Source: Haring (2001); Appendix A of Haring (2001); EES 2001; YSRB 2004; Conley (pers. comm.) and Hubble (pers. comm.). The sources contains information for the other smaller tributaries that flow to these creeks not listed here.

Table C-2
Habitat Conditions for Flow in Streams in the Affected Area

Stream	Description of Flow Conditions
Above-Reservoir Tributaries	
Cle Elum River above Reservoir	No flow issues because most of the flow concerns in the Cle Elum basin are concentrated downstream of Cle Elum Dam.
Bumping River above Reservoir	Not been altered and follow a natural regime. Adequate flows and low likelihood of rain-on-snow events due to abundant canopy cover and a large percentage of area in high elevation zones.
Tieton River above Rimrock and Clear Lake Reservoirs	Essentially unchanged from historic conditions. Few habitat alterations have occurred upstream of the dams, and natural stream flow variability still occurs. Indian Creek, tributary to Rimrock Lake in the Tieton watershed, has three large springs that significantly contribute to instream flows. The South Fork Tieton contributes 36 percent of the total flow of the Tieton River, and North Fork Tieton/ClearCreek/Indian Creek contributes 47 percent of the total flow (USFS, 1996a).
Keechelus River above Reservoir	Gold Creek is the only tributary with enough area and flow to potentially support salmonids. In recent years, portions of the Gold Creek channel upstream of the dam have dewatered due to low flows.
Kachess River above Reservoir	Tributaries, including the Kachess River, typically go subsurface as the lake is drawn down in summer.
Yakima River Tributaries	
Big Creek	Natural runoff is fully appropriated for irrigation, and while the stream typically flows, the channel periodically goes dry from RM 0.6 to the mouth, depending on the year.
Teanaway River	Low flows in the summer and fall have in the past precluded fish passage, but there is now some flow in the summer and fall in the lower river. However, the lower river is still impaired for instream flow. Reduction in flow is attributed mainly to irrigation withdrawals in the lower river.
Swauk Creek	Although the drainage area is fairly large, precipitation is minimal, and naturally occurring low flows occur throughout the system. Lower Swauk Creek goes dry in the summer and early fall.
Taneum Creek	Experiences very low summer and fall flows in the lower 3.3 miles downstream of its major diversion, because flows are fully appropriated for irrigation.
Jack Creek	See Teanaway River.
Indian Creek	See Teanaway River.
Manastash Creek	Instream flows are severely impacted by irrigation diversions during the irrigation season. One section of the creek goes dry.
Reecer Creek	Reecer Creek has perennial flow in headwaters, but is intermittent to Highline Canal during late summer; dry reaches downstream.
Wilson/Naneum Creeks System[1]	Along with other creeks in the area, Naneum Creek has been routed into Wilson Creek to supply irrigation needs for the area. Currently, flows are available year-round for salmonids in the lower Wilson Creek drainage, as flows are dominated by irrigation returns (KCCD, 1999). In the upper watersheds, streams dewater during summer and fall due to irrigation withdrawals. Cherry Creek tributaries have significantly increased flows during summer/early fall compared to natural conditions.

Stream	Description of Flow Conditions
Ahtanum Creek[2]	On Ahtanum Creek, stream flow typically characterized by the occurrence of high spring/early summer flows and low late summer/fall flows. Stream flow in the upper watershed is ample and is influenced primarily by snowmelt and rainfall (Ecology, 2005a). Lower in the creek, and downstream of irrigation diversions, flow is constant to the confluence with the Yakima River (CBSP, 1990) but is highly variable year-to-year (Ecology, 2005a). On Wide Hallow Creek, monthly flow variations are presumed to be similar to those in Ahtanum Creek, although Wide Hollow Creek flows are affected to a greater degree during the irrigation season by inflow from Yakima-Tieton Irrigation District operations.
Toppenish Creek	Toppenish Creek and its upper tributaries are fast-flowing streams with high gradients, while the lower half of the watershed has a lower gradient and generally slower velocities. Various parts of the creek's flow become subsurface or become dewatered during the irrigation season (primarily from the WIP diversion to Pom Pom Road). In dry years, Toppenish Creek experiences seepage losses (which may be partly of human origin) which combine with agricultural diversions to restrict passage to and from the most important spawning and rearing areas in the creek (YSRB, 2004).
Satus Creek	Instream flows are fair to good, except for low summer flows in the vicinity of High Bridge (CBSP, 1998). No irrigation diversions.
Cowiche Creek	Flow in the mainstem and South Fork is year-round, despite substantial irrigation withdrawals (CBSP, 1990). Diversions significantly reduce summer and fall flows in the lower 12 miles of the creek system.
Little Naches River	There are no permanent surface water diversion within the Little Naches watershed (USFS, 1994). However, the NF Little Naches has two dewatered reaches in late summer as a result of increased sediment load from landslides and debris flows.

Table Notes:

[1] Includes Wilson, Naneum, Coleman, and Cherry Creeks, which are all interconnected.

[2] Includes North and South Forks and Wide Hollow Creek.

Table C-3
Habitat Conditions for Sediment in Streams in the Affected Area

Stream	Description of Sediment Conditions
Above-Reservoir Tributaries	
Cle Elum River above Reservoir	Fine sedimentation is low upstream of Cle Elum Dam (USFS, 1996a), although erosion hazards are high in the more mountainous drainages.
Bumping River above Reservoir	No research on sediment conditions on the Bumping River upstream of Bumping Dam.
Tieton River above Rimrock and Clear Lake Reservoirs	Large natural slide (Blue Slide) contributes a large amount of sediment to the South Fork Tieton. Grazing and off-road vehicle use erodes streambanks on South Fork Tieton, increasing fine sediment to spawning areas. No quantitative fine sediment data (USFWS, 2001).
Keechelus River above Reservoir	No major sedimentation problems, with the exception of Coal Creek, which receives sand from Interstate 90 maintenance operations.
Kachess River above Reservoir	Rated at high risk of road-related sediment problems (USFS, 1997) as part of the Kachess and Box Canyon Forest Planning Units.
Yakima River Tributaries	
Big Creek	Erosion risk ranges from low to moderate on the river terraces to high to very high in the steeper regions of the upper watershed (KCCD, 1999), but fine sedimentation has not been a key problem for the creek.
Teanaway River	Fair to good. Sedimentation is uncommon in the North Fork. Substrate fair to good, with excellent spawning gravels in the Middle Fork and West Fork.
Swauk Creek	Fine sediment accumulations in gravels caused by past mining and dredging practices (KCCD, 1999). Fines likely heavily influenced by sanding of SR 97.
Taneum Creek	Fine sediments are a problem at most spawning and rearing habitats, attributed to bank and slope erosion from forest practices, road construction, and grazing. Upper watershed has extensive forest road network that sends high amounts of sediment to the channel.
Jack Creek	USFS Road 9738 is adjacent and delivers fine sediment to the stream.
Indian Creek	Indian Creek Road that runs parallel delivers fine sediment to the stream.
Manastash Creek	Moderate sedimentation issues, with several streams exhibiting elevated fines percentages. Sediment sources are bank cutting, slope erosion, and bank disturbances (Plum Creek, 1996).
Reecer Creek	Substrate is considered good in upper watershed and embedded through the valley.
Wilson/Naneum Creeks System[1]	Large amounts of fine sediments due to surface erosion from ground disturbances, forest practices, grazing, and recreation (WDNR, 1994). The Wilson Creek system receives high levels of fines from urban runoff and irrigation, and the Cherry Creek system receives even larger levels.

[1] Includes Wilson, Naneum, Coleman, and Cherry Creeks, which are all interconnected.

[2] Includes North and South Forks and Wide Hollow Creek.

Stream	Description of Sediment Conditions
Ahtanum Creek[2]	Fine sediment deposition perhaps the single greatest limiting factor on fish production in the Ahtanum watershed (Ecology, 2005a). Fine sediment is heavy and variable due to sources of sediment from roads and logging in the upper watershed and development in the lower watershed. In the lower creek, gradients are low and bank erosion has resulted in deposition of sand and mud in the channel (CBSP, 1990). In Wide Hollow Creek, sedimentation and substrate are rated as fair (CBSP, 1990).
Toppenish Creek	Sediment embeddedness moderate to high in middle and lower Toppenish Creek due to diversions and water-slowing dams (CBSP, 1990). Substrate condition is excellent in the upper 25 miles as well as in North and South Forks, with abundant gravel of very high quality (CBSP, 1990).
Satus Creek	Sedimentation rated as fair/good, but variable throughout the watershed (CBSP, 1990). Excessive fines throughout, but upper reaches are in better condition.
Cowiche Creek	Sedimentation generally minor except in the North Fork, where low flows have allowed fines to settle out.
Little Naches River	Excessive amounts of fine sediments in gravels associated with timber harvest and roads.

Table Notes:

1 Includes Wilson, Naneum, Coleman, and Cherry Creeks, which are all interconnected.

2 Includes North and South Forks and Wide Hollow Creek.

Table C-4
Habitat Conditions for LWD in Streams in the Affected Area

Stream	Description of LWD Conditions
Above-Reservoir Tributaries	
Cle Elum River above Reservoir	Plentiful in at least one reach of the Cle Elum River upstream of Cle Elum Lake.
Bumping River above Reservoir	Expected to have high levels of LWD, as LWD presence in all reaches of the Bumping River has been shown to meet or exceed standards (USFS, 1998).
Tieton River above Rimrock and Clear Lake Reservoirs	Expected to be abundant, as tributaries upstream of the Tieton Dam historically provided LWD source to those lower in the river.
Keechelus River above Reservoir	Generally deficient in LWD due to high levels of timber harvest, with the exception of Cold Creek and Meadow Creek, which have satisfactory LWD conditions.
Kachess River above Reservoir	Little opportunity to provide LWD to the system due to removal of riparian vegetation and timber harvest near these creeks. LWD abundance generally declines moving upstream from Lake Kachess (USFS, 1997).
Yakima River Tributaries	
Big Creek	The lower reaches have little LWD; abundance increases dramatically in the upper reaches, particularly upstream of the KRD Canal.
Teanaway River	Generally absent, particularly key pieces not easily mobilized by high flows.
Swauk Creek	LWD is lacking in the lower 3 miles as well as upstream from Blue Creek.
Taneum Creek	LWD has been aggressively removed from lower Taneum Creek, and the current stream has little LWD present except in the upper reaches and in the North and South Forks.
Jack Creek	See Teanaway River.
Indian Creek	See Teanaway River.
Manastash Creek	Sparse LWD because most naturally recruited wood has been removed.
Reecer Creek	LWD is lacking.
Wilson/Naneum Creeks System[1]	Little LWD due to lack of source and the current use of the creeks for irrigation water transfer, especially in Cherry Creek tributaries.
Ahtanum Creek[2]	Lacking throughout the mainstem channel segments in Ahtanum Creek (Chesney, 1997; Dominguez, 1997), leading to reduced habitat complexity and problems related to channel stability/bed scour, off-channel habitats, and predation risk (Ecology, 2005a). In Wide Hollow Creek, LWD is generally lacking; although there is some LWD contribution from mature willows adjacent to the stream, the LWD is typically removed to minimize potential for bank erosion and channel rerouting in the tightly confined stream corridor.
Toppenish Creek	Abundant LWD due to relatively unaltered condition. In middle and lower creek, there is virtually no LWD and no significant sources for it.
Satus Creek	Largely devoid of LWD. Much of the available LWD was transported out of the active channel by floodwaters and stranded on the floodplain during the major floods of 1996 and 1997.
Cowiche Creek	LWD abundant in the mainstem, but becomes sparse in the lower creek due to the location in naturally confined canyons or low gradient in the floodplain.
Little Naches Rver	Survey data from 1990 indicates an LWD rating of poor throughout this area, ranging from 4 pieces/mile at the downstream end to 20 pieces/mile at the upstream end (USFS, 1994).

Table Notes:

Table C-5
Channel Condition in Streams in the Affected Area

Stream	Description of Channel Conditions
Above-Reservoir Tributaries	
Cle Elum River above Reservoir	Various channel types, including an unconfined distributary fan near the lake, a confined canyon reach, a moderately steep alluvial reach, and two lakes. Some of these reaches have excellent habitat, and some contain low pool volume and reduced habitat complexity.
Bumping River above Reservoir	Instream conditions are excellent, as most of the Bumping River watershed exists in higher elevation, unaltered areas.
Tieton River above Rimrock and Clear Lake Reservoirs	Habitat in the upper reaches of the South Fork Tieton and Bear Creek is pristine. In Rimrock Lake tributaries of the Tieton watershed, channel conditions of pool frequency and quality are rated as good.
Keechelus River above Reservoir	Tributaries differ in channel condition, but are generally degraded. Coal Creek has sedimentation problems, while Cold Creek lies within the reservoir drawdown zone and lacks an adequate riparian corridor. Meadow Creek has high temperatures, but otherwise has good habitat, while some portions of Gold Creek channel dewater during summer.
Kachess River above Reservoir	Excellent bank stability due to their rock-dominated substrates (USFS, 1995), but in-channel pools and complexity are lacking.
Yakima River Tributaries	
Big Creek	Heavily channelized downstream of RM 3.0, resulting in unstable channels and erosion in the lower 0.25 mile. Pool frequency is low (USFS, 1997) and habitat complexity is limited. Riparian condition is good in the upper watershed and gradually degrades to fair in the channelized reach near the mouth of the creek.
Teanaway River	Suitable spawning gravels and gradients for salmonids in most reaches of the mainstem and the lower portions of the forks. Riparian habitat is excellent, though there are localized impacts on the forks (CBSP, 1990). Channel widening due to lack of complexity typically does not allow shade to reach the concentrated flow in the center of the stream.
Swauk Creek	Natural substrate conditions have been altered due to dredging and past mining operations in some places. In most of the creek, the general lack of LWD and boulders from the channel have led to a loss of structural complexity and channel incision.
Taneum Creek	Channel conditions are fair. LWD and boulders are abundant on the North and South Forks, except where LWD has been cleared. Pool frequency is low in the lower reaches due to only a moderately steep gradient. Riparian habitat is good in unimpacted forest areas, but is poor where roads and campsites are present alongside the channel.
Jack Creek	See Teanaway River.
Indian Creek	See Teanaway River.
Manastash Creek	Excellent spawning and rearing habitat for anadromous salmonids, with vegetation and streambank cover in nearly all areas of the mainstem (CBSP, 1990). In some forested reaches, including the South Fork Manastash Creek, riparian conditions are poor (Plum Creek, 1994).
Reecer Creek	Few pools; channelized upstream from Dollar Way to I-90 for agricultural and irrigation purposes.

Stream	Description of Channel Conditions
Wilson/Naneum Creeks System[1]	Both Naneum and Wilson Creek are channelized and diked for irrigation delivery. Reaches are straight and incised, have high velocities, and little LWD or riparian zone. Cherry Creek has large reed canarygrass invasion (Haring, 2001).
Ahtanum Creek[2]	On Ahtanum Creek, channel has extensive bank erosion in an area with reduced and fragmented riparian canopy and cover (Chesney, 1997), as well as confined channels that do not provide adequate side channel or floodplain habitat. On Wide Hollow Creek, overgrazing has caused severe bank sloughing from RM 0.2-0.6. The reach from RM 1.3-2.5 also had significant impacts from past grazing, but land use through this reach has recently been converted to a business park. Pools and runs are fairly deep (>2 feet), and are more frequent than riffles.
Toppenish Creek	Channel conditions in the uppermost 25 miles of Toppenish Creek, as well as North and South Forks, are good (CBSP, 1990). Key issues in the rest of Toppenish Creek are channelization, diking, diversions, wastewater return flows, unmanaged grazing, and “to the bank” farming.
Satus Creek	Channel has widened and straightened, riparian composition has changed, (YSPB, 2004), and the lower 6 miles are slow moving with a mud/sand streambed and a few isolated riffles.
Cowiche Creek	Conditions are generally good, providing excellent spawning and rearing habitat. The lower portions of the creek exhibit low gradients and are confined and incised.
Little Naches River	Primary degraded portion is from mouth of the Little Naches upstream to Sand Creek. Pools are below standards identified in Forest Plan. Bank erosion and downcutting in streambed. Habitat pristine upstream of Salmon Falls (CBSP, 1990).

Table Notes:

[1] Includes Wilson, Naneum, Coleman, and Cherry Creeks, which are all interconnected.

[2] Includes North and South Forks and Wide Hollow Creek.

Table C-6
Habitat Alterations in Streams in the Affected Area

Stream	Barriers	Description of Habitat Alterations
Above-Reservoir Tributaries		
Cle Elum River above Reservoir	None except reservoir	Creation of the dam and slowing of river flows nearing the dam, as well as riparian and LWD removal due to timber harvest and residential development in the upper watershed.
Bumping River above Reservoir	None except reservoir	Tributary habitat remains generally unaltered.
Tieton River above Rimrock and Clear Lake Reservoirs	None except reservoir	Tributary habitat remains generally unaltered.
Keechelus River above Reservoir	None except reservoir	Many of the small tributaries to the lake were inundated with the creation of Keechelus Dam. Prior to inundation, the lower reaches of these channels were meandering, low gradient channels with more complex habitat than what is available above the lake elevation. Coal Creek has been relocated and confined as it runs alongside Interstate 90.
Kachess River above Reservoir	None except reservoir	The tributaries have been affected by dam construction and inundation of the lower streams, as well as logging that has resulted in reduced canopy cover in the stream corridors.
Yakima River Tributaries		
Big Creek	2 non-screened diversion dams, RM 0.7 and RM 2.1 (the latter is impassable most years)	Channelization downstream of RM 3.0 to support water diversion needs, as well as removal of LWD.
Teanaway River	No constructed barriers to upstream passage on mainstem	Loss of most natural floodplain function throughout the lower watershed due to residential development. River now experiences a “flashy” runoff as a result of extensive logging in the upper watrershed.
Swauk Creek	No constructed barriers to upstream passage on mainstem	Beaver elimination, mining, and livestock grazing removed the wet meadows from the creek, and the creek now flows through a single channel. Instream substrate conditions were altered by dredging and now exhibit abundant fines and lack of complexity.
Taneum Creek	Irrigation diversions cause low flows and may preclude access for various species, typically in summer and fall; some of these have been remedied; all have fishways and screens	Channelization and LWD removal, as well as a large network of forest roads in the upper watershed lead to sediment problems downstream.
Jack Creek	See Teanaway River.	See Teanaway River.

Stream	Barriers	Description of Habitat Alterations
Indian Creek	See Teanaway River.	Indian Creek Road confines channel migration zone. Past grazing (mainly sheep) activities have had pronounced effects on riparian vegetation and streambank stability.
Manastash Creek	Irrigation diversions cause low flows which preclude access (furthest downstream is Westside Ditch Crossing)	Watershed has been altered by timber harvest and road building, which leads to sedimentation in the channel. Grazing practices have caused entrenchment of channels and erosion in the North Fork.
Reecer Creek	Unladdered/unscreened diversions upstream and downstream of SR10 and upstream of Dry Creek Road and John Wayne Trail; Unscreened Kline-Koble diversion 100 feet upstream of mouth of stream. Unscreened Mill Ditch Diversion.	Stream channelized for several miles for agricultural and irrigation purposes.
Wilson/Naneum Creeks System[1]	Irrigation diversions cause low flows which preclude access (furthest downstream is at Bull Ditch Crossings near confluence with Wilson Creek). Wilson and Cherry Creeks and tributaries have hundreds of unladdered and unscreened irrigation diversions.	Naneum and Wilson Creek system has been diked, channelized, and re-routed for water delivery. Riparian vegetation is sparse.
Ahtanum Creek[2]	On Ahtanum Creek, 13 unscreened diversions Upper WIP facility at RM 19.6 diverts all or most of the stream flow in summer and early fall. The lower WIP diversion at RM 9.8 is total barrier. On Wide Hollow Creek, adult passage available at old mill dam at RM 0.6, but juvenile salmon cannot pass.	Altered by road development for logging in the upper Ahtanum Creek. Many stream channels on lower Ahtanum Creek have been severely impacted by agriculture, irrigation, and grazing (Tri-County, 2000). Alterations have resulted in low flows, poor riparian conditions, and contributions of excess sediment to the stream. Wide Hollow Creek has stormwater runoff, leaking septics, and agricultural practices (mostly hay and pasture).

Stream	Barriers	Description of Habitat Alterations
Toppenish Creek	Upper 25 miles, including North and South Forks, have a number of large, slightly perched culverts Irrigation dewaters stream in some areas. Fish ladder areas. Small dams for hunting club ponds.	Much alteration from historic conditions. Drainage of and loss of complexity in the historically extensive network of wetlands have combined with water withdrawals to reduce flows in the lower Toppenish, and side channels are mostly dry during the irrigation season. Low flows cause fish passage problems mainly at the WIP diversion at river mile 44 and in lower Simcoe Creek as well as at various tributary culverts.
Satus Creek	No constructed barriers to upstream passage on mainstem	Most of the Satus Creek watershedis undeveloped and is not exposed to agricultural, industrial or domestic effluents, but past grazing and road construction have had a major effect. Headwater meadow systems have been incised due to timber road construction and livestock grazing, and the systems are generally degraded. Unrestricted streamside grazing is now excluded, but riparian corridor was damaged during use as open range. These weakening factors allowed the major floods of 1996 and 1997 to de-stabilize the channel in the mid-elevations of the creek.
Cowiche Creek	No constructed barriers to upstream passage on mainstem	Diversions for irrigation as well as development for housing and recreational facilities in the lower portion of the creek.
Little Naches River		High road density and timber harvest have caused excessive fine sediment load. LWD was removed through channel cleaning and flood rehabilitation efforts. Loss of off-channel habitat due to channelization.

Table Notes:

[1] Includes Wilson, Naneum, Coleman, and Cherry Creeks, which are all interconnected.

[2] Includes North and South Forks and Wide Hollow Creek.

Appendix D.
Notice of Adoption

NOTICE OF ADOPTION OF EXISTING ENVIRONMENTAL DOCUMENT

Description of current proposal: Yakima River Basin Integrated Water Resource Management Final Environmental Impact Statement (EIS)

(Conducted as part of the Yakima River Basin Water Storage Feasibility Study Supplemental Draft EIS)

Proponent: Washington State Department of Ecology

Location of current proposal: Yakima River Basin, State of Washington

Title of document being adopted: Yakima River Basin Water Storage Feasibility Study Final Planning Report/EIS

Date adopted document was prepared: January 2008

Description of document (or portion) being adopted: The Final Planning Report/EIS is a National Environmental Policy Act (NEPA) document prepared by the U.S. Bureau of Reclamation (Reclamation). It evaluated three storage alternatives—Black Rock, Wymer, and Wymer Plus Pump Exchange. The Final Planning Report/EIS recommends the No Action Alternative as the preferred alternative. Reclamation concluded that the benefits of the storage alternatives, when weighed against the impacts and costs, did not provide justification for moving forward with any of the three alternatives.

If the document being adopted has been challenged (WAC 197-11-630), please describe:
N/A

The document is available to be read at (place/time): Reclamation's Yakima River Basin Water Storage Feasibility Study Draft Planning Report/Environmental Impact Statement was distributed to agencies with jurisdiction, Tribes and other interested parties in January 2008. The document may be viewed at Department of Ecology offices during normal business hours (8:00 a.m. to 5 p.m., Monday to Friday) at the following locations:

Department of Ecology Headquarters
300 Desmond Drive
Lacey, WA 98503

Department of Ecology Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902-3452

The adopted document can be viewed on-line at:
http://www.usbr.gov/pn/programs/storage_study/index.html

EIS REQUIRED: The lead agency has determined the Yakima River Basin Integrated Water Resource Management alternative is likely to have a significant adverse impact on the environment. To meet the requirements of RCW 43.21C.030(2)(c), the lead agency is adopting portions of the NEPA document described above, in addition to preparing a stand-alone SEPA Final EIS for the proposal, to fulfill its requirements under SEPA.

The lead agency has determined that this document is appropriate for the proposal and will accompany the proposal to decision makers.

Name of agency adoption document: Washington State Department of Ecology

Responsible Official: Derek I. Sandison

Position/title: Director, Office of Columbia River **Phone:**

Address: 15 West Yakima Avenue, Suite 200
Yakima, WA 98902-3452

Phone: 509-457-7120

Date: June 12, 2009 **Signature:** Derek I Sandison