Yakima River Basin Integrated Water Resource Management Plan

Final Fish and Wildlife Coordination Act Report

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Prepared for

Bureau of Reclamation

Columbia Cascades Area Office

Yakima, Washington

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EXECUTIVE SUMMARY

A number of projects to improve water supply and benefit fish habitat continue within the Yakima River Basin. For the past two years, the Washington Department of Ecology (Ecology) and the Bureau of Reclamation (Reclamation) have facilitated the Yakima River Basin Water Management Program (YRBWMP) workgroup whose purpose is to identify solutions for water resource issues within the basin. The development of the Yakima River Basin Integrated Water Resource Plan (Integrated Plan) is the third and final planning phase of the Yakima River Basin Water Enhancement Project (YRBWEP). The Integrated Plan will improve water supply for irrigated agriculture and future municipal needs concurrently with making habitat improvements for fish and terrestrial wildlife.

The Integrated Plan is comprised of seven elements as negotiated among several stakeholder groups, including the U.S Fish and Wildlife Service (Service) and Washington Department of Fish and Wildlife (WDFW). The Service and WDFW participated in the Integrated Plan process to ensure that elements of the Integrated Plan included long-term benefits to fish and wildlife resources, to resolve current fish and wildlife issues in the Basin, and minimize future, anticipated impacts of plan implementation. As a result of this multi-stakeholder planning approach, the Integrated Plan is the only proposed Action Alternative, consisting of a range of proposed actions designed to meet objectives within a single plan. The Integrated Plan will guide a series of actions that would be implemented by Reclamation and Ecology programs at the programmatic level. The Integrated Plan is intended to be implemented in its entirety, thereby balancing gains in water supply for use in agriculture and by municipalities with the conservation of natural resources, as well as other stakeholder benefits. Natural resource costs and benefits will be balanced throughout implementation of the plan.

Fish and wildlife resources of concern and of major Federal interest include bull trout, bull trout critical habitat, northern spotted owls, northern spotted owl critical habitat, critical habitat for steelhead, and habitat for sage-grouse. These species and habitats, to varying degrees, are dependent on areas within the Affected Area that may be beneficially or negatively impacted as a result of implementing the Integrated Plan. The Service is of the opinion that the Action Alternative (proposed programmatic level actions) has greater probability of improving fish and wildlife resources than what currently exist within the Yakima River basin under the No Action Alternative.

Details of the Project effects on federally-listed species, associated conservation measures, and mitigation will be addressed in future section 7 consultation(s), as project elements are proposed and evaluated for environmental compliance under state and federal law. Changes to the Integrated Plan that were not contemplated at the time this Final Coordination Act Report (CAR) was developed, may require additional review or subsequent reports.

The WDFW and the Service have intensively coordinated on the development of this CAR. WDFW's specific concerns and comments have been integrated within this document.

I. PURPOSE, SCOPE, AND AUTHORITY

Pursuant to the Fish and Wildlife Coordination Act (16 USC §661-666c) the U. S. Fish and Wildlife Service (Service) and the Washington State Department of Fish and Wildlife (WDFW) prepared this Final Coordination Act Report (CAR) for Reclamation and the Washington State Department of Ecology's (Ecology) joint effort to submit the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan) Final Programmatic Environmental Impact Statement (PEIS) for further consideration. The Integrated Plan builds on previous planning efforts to identify water resource solutions to water use and supply issues in the Yakima River Basin (Basin).

The Yakima River Basin is affected by an inadequate water supply to meet demands for agriculture, fish, and municipal and domestic uses. Since at least the 1970s, federal, state and local agencies and the Yakama Nation natural resource managers within the Basin have participated in planning efforts to identify solutions to water supply issues. Elements of the Integrated Plan were developed to protect, mitigate, and enhance fish and wildlife habitat and improve the reliability of the water supply for irrigation, municipal supply and domestic uses. The Service participated in the planning process to assure that elements of the plan included long-term benefits to fish and wildlife resources that would minimize future, anticipated impacts to these resources. As a result of this multi-stakeholder planning approach, the Integrated Plan serves as the only Action Alternative determined to adequately address the multitude of concerns in the basin; therefore, no other Action Alternatives are proposed.

The development of multiple project-level NEPA compliance documents to address each project element prior to project implementation would be required, if the Integrated Plan is approved and authorized. Details of each project's effects on federally-listed species and required mandatory terms and conditions will be addressed in future section 7 consultation(s). Changes to the Integrated Plan that were not contemplated at the time of development of this CAR due to the DEIS not being available, as well as changes and/or updates that may occur to the Integrated Plan over time may require additional review or subsequent reports.

The purpose of this CAR is to:

- Describe the baseline condition of fish and wildlife resources likely to be affected within the project area;
- Describe potential effects of the two alternatives on fish, wildlife, and their habitat;
- Propose conservation measures to be included in the Integrated Plan as project elements; and
- Recommend the alternative that best meets the needs of fish and wildlife resources.

The Washington Department of Fish and Wildlife (WDFW) and the Service have intensively coordinated on the production of this CAR. WDFW's specific concerns and comments have been integrated into the Final CAR.

II. BACKGROUND

History

Ecology and Reclamation for the past two years have facilitated the YRBWEP Workgroup that culminated in developing the Yakima River Basin Study Report, which was the basis for the programmatic FEIS and Integrated Water Resource Management Plan (Reclamation, 2011). Enactment of the YRBWEP legislation by Congress in 1979 has produced many studies and activities associated with managing water in the Basin. Key milestones of associated prior studies and activities are outlined below:

1979: Yakima River Basin Water Enhancement Project (Public Law 96-162): The Yakima River Basin Water Enhancement Project (YRBWEP) was initiated by Congress in 1979 in recognition of the extreme water shortage problems of the Basin. Since then, state and federal YRBWEP feasibility study activities have been ongoing with the objectives of developing and implementing a comprehensive solution for efficient management of Yakima Basin water supplies.

1984: Congressional legislation (Public Law 98-381): Congress authorized Reclamation to design, construct, and operate fish passage facilities within the Yakima River Basin that are in accordance with the Northwest Power and Conservation Council's (NPCC) Columbia River Fish and Wildlife Program (YRBWEP Phase 1).

1994: YRBWEP Phase 2 (Public Law 94 103-434): Congress passed Public Law 94 103-434 which provided for significant water conservation and acquisition activities; studies to define the long-term water needs of fish and irrigators; improvements to the Wapato Irrigation Project; and development of an interim operations plan for management of basin water supplies.

1999: Final Programmatic Environmental Impact Statement, Yakima River Basin Water Enhancement Project, Washington: The U.S. Bureau of Reclamation submitted a Final EIS to implement Phase 2 of the Yakima River Basin Water Enhancement Project to meet the water needs of the basin through improved water conservation and management and other appropriate means.

2003: Congress authorizes Yakima River Basin Water Storage Feasibility Study: The Water Storage Study examined the feasibility and acceptability of storage augmentation in the Yakima River Basin, with an emphasis on a proposed Black Rock Reservoir.

2005: *Yakima Dams Fish Passage, Phase 1 Assessment Report*: The U.S. Bureau of Reclamation completed the Phase 1 assessment to determine the range of options and opportunities for providing fish passage, as well as reestablishing populations of anadromous salmonids in some tributaries of the five Yakima Project storage reservoirs.

2008: Draft PR/EIS, Yakima River Basin Water Storage Feasibility Study: Ecology and Reclamation released a Draft Planning Report/Environmental Impact Statement (PR/EIS) for the Storage Study in January and a Final PR/EIS in December.

2008: Supplemental Draft EIS, Integrated Water Resource Management Alternative: Based on the comments received on the Draft PR/EIS, Yakima River Basin Water Storage Feasibility

Study Ecology began a separate evaluation of an alternative solution to the Yakima Basin's water supply problems, including consideration of aquatic habitat and fish passage needs. This alternative was named the "Integrated Water Resource Management Alternative".

2009: Supplemental Final EIS, Integrated Water Resource Management Alternative: Ecology released the FEIS for the proposed Integrated Water Resource Management Alternative, which was comprised of seven elements: fish passage, structural/operational changes, surface storage, ground water storage, fish habitat enhancements, enhanced water conservation, and market-based reallocation of water resources.

2009: Preliminary Integrated Plan: Reclamation and Ecology, in collaboration with the Workgroup reached consensus to move forward with the preliminary Integrated Plan in 2009. This plan included as part of the seven elements, a list of potential water supply actions for surface and groundwater, proposed modifications to existing operations, fish passage at existing reservoirs, a proposed fish habitat enhancement program, and actions related to market reallocation.

2010: Basin Study: During preparation of the preliminary Integrated Plan and the Basin Study, Workgroup subcommittees provided input on the Integrated Plan and the supporting technical work. Results and recommendations were then reviewed by the Workgroup. Parallel with subcommittee efforts, potential actions for inclusion in the Integrated Plan were characterized through engineering analyses and cost estimates to refine available information and consider alternative project configurations. The scoping process for this most recent study was initiated in April, 2011.

A number of projects to improve water supply and benefits to fish are on-going in the Yakima River basin. Some examples of on-going projects within the basin include:

- Yakima River Basin Water Enhancement Project
- Reclamation Improvements to Existing Facilities
- Yakima Tributary Access and Habitat Program
- Yakima/Klickitat Fisheries Project
- Yakima River Side Channels Project
- Kittitas Conservation Trust
- Salmon Recovery Funding Board Supported Projects
- Yakima County Comprehensive Flood Hazard Management Plans
- Washington State Department of Transportation Programs
- Conservation Projects by Private Organizations

III. YAKIMA RIVER BASIN INTEGRATED WATER RESOURCE MANAGEMENT PLAN PROJECT DESCRIPTION

Reclamation and Ecology facilitated the development of the Integrated Plan to improve water supply for irrigated agriculture and future municipal use while creating habitat improvements for fish and terrestrial wildlife. The Integrated Plan serves as the third and final phase of the YRBWEP.

On October 10, 2007 the Service provided a CAR for the January 2008, Ecology and Reclamation *Draft Planning Report/EIS for the Yakima River Basin Water Storage Feasibility Study* that evaluated opportunities for water storage in the basin. A Supplemental EIS was released December 10, 2008 that included an alternative named the "Integrated Water Resource Management Alternative." The *2009 Yakima River Basin Integrated Water Resource Management Alternative Final EIS* expounded upon that alternative and responded to comments that have been gathered since 2008.

In 2009, the YRBWEP work group was formed and encompassed representation from federal, state, and local resource agencies, tribes, counties, and other stakeholder groups to identify pathways to achieve meeting multiple water management needs within the Yakima River Basin. The elements of the Integrated Plan were generated by the work group to protect, mitigate, and enhance fish and wildlife habitat; provide increased operational flexibility to manage instream flows to meet ecological objectives, and improve the reliability of the water supply for irrigation, municipal supply and domestic uses.

The Integrated Plan consists of seven elements. These seven elements are evaluated in this document at the programmatic level as described in the Final PEIS and include:

1) Fish passage
2) Structural and operational changes
3) Surface water storage
4) Groundwater storage
5) Habitat protection and enhancement
6) Enhanced water conservation and
7) Market-based reallocation.

The development of the Integrated Plan relied heavily on existing science and input from several stakeholder groups who identified existing water resource and habitat complexities within the basin. The Integrated Plan was developed from studies initiated in 1979 and a large body of research conducted in the Basin over the years.

IV. DESCRIPTION OF THE AFFECTED AREA

For this report, the Service has determined the *Affected Area* to be all areas within the Yakima River Basin as identified in the November 2011 Draft PEIS (Figure 1). For additional details please refer to the list provided in the *Background* section of this document; particularly the *Yakima River Basin Water Enhancement Project Programmatic EIS* (Reclamation and Ecology, 1999) and the *Yakima River Basin Study, Volume 1, Proposed Integrated Water Resource Management Plan* (Reclamation, 2008a).

The Yakima River Basin

The Yakima River Basin is located in south-central Washington and encompasses about 15,900 square kilometers (6,155 square miles). The Yakima River is the largest tributary to the Columbia River that lies entirely within the State of Washington. The Yakima River flows southeasterly for about 344 kilometers (214 miles) from its headwaters to its confluence with the Columbia River near Richland, Washington. Elevations in the basin range from 2,496 meters (8,184 feet) above mean sea level in the Cascades to 104 meters (340 feet) at the rivers' confluence. The river drains a portion of the eastern slope of the Cascade Mountain Range and the semi-arid mountains and lowland of Kittitas, Yakima, Klickitat, and Benton Counties.

The common hydrologic pattern in the drainage is the result of water mostly originating in higher aquifers. This hydrologic system has been greatly modified by human activities, mostly to provide more dependable dry-season surface water supplies for agricultural use. Prior to the introduction of widespread irrigation to the Yakima River Basin in the late nineteenth century, the Yakima River experienced nearly annual flooding due to spring snowmelt and run-off; this has been considerably reduced due to the development of various irrigation-related projects that dammed tributaries in the upper reaches and regulated their flow (USFWS, 1996).

On average, the Yakima River has a very low gradient, averaging less than one tenth of one percent, from its mouth at the Columbia River, to a point 328 km (214 miles) upstream at the base of Reclamation's Keechelus Dam near Snoqualmie Pass (USGS 1991). Estimated average annual runoff in the Basin is about 3.4 million acre-feet per year. Once the river leaves the Yakima Canyon, it meanders across the lower Yakima Valley, often in a well-incised channel, except for 20 miles downstream of Sunnyside Irrigation Dam where the channel is braided. The lower Yakima River Valley (below river mile 123/ km 198) is a fairly broad, flat, ancient floodplain of fertile soils, where agriculture has flourished in the years since irrigation was established. In 1992, the U. S. Geological Survey (USGS) commented that the Basin is one of the most intensively irrigated areas in the United States. These irrigated lands primarily produce fruits, vegetables, hops and livestock feed (USFWS, 1996).

Large seasonal flow variations in the Yakima River have been modified since the late 19th century by development and operation of irrigation, hydropower and storage projects on the mainstem Yakima, Kachess, Cle Elum, Bumping and Tieton Rivers. The six storage reservoirs **(**including Clear Lake) operated by Reclamation capture and store a portion of the spring runoff (a total of about 1,070,000 acre-feet maximum storage) and release it in summer and early autumn for irrigation. While these reservoirs are managed primarily for irrigation uses, since 1981 some of the stored water has been used to benefit anadromous fish redds in the upper Yakima River (Reclamation, 1996). Also, some reservoir releases during the summer are being

managed to enhance spring Chinook spawning activities in September and October. The operation of these reservoirs and many other irrigation facilities in the Basin is the responsibility of Reclamation's Yakima Project.

The Naches River sub-basin is tributary to the Yakima River, and drains a portion of the eastern side of the Cascade Range, east of Mount Rainier and northeast of Mount Adams. In terms of discharge, the Naches River is the largest tributary in the Basin.

In recent years, the "flip flop" flow management has extended from about August 20 through September 10 to facilitate spring Chinook spawning. The purpose of the "flip flop" operation is to conserve reservoir carry over water storage that needs to be released in the winter to protect salmon redds during the incubation period. "Flip flop" is the term used to describe the water management operations that decrease the daily flows in the upper Yakima River by 40-50 cfs over a 20 day period in late summer while flows are correspondingly increased in the lower Naches River. This change in flows results in spawning flows of approximately 180 cfs in the Keechelus and Easton reaches of the upper Yakima River and in the lower Cle Elum River. Prior to instituting the "flip flop" operation, spawning flows used by spring Chinook were much higher, which required a greater amount of carryover storage to sufficiently maintain viable egg incubation throughout the winter period.

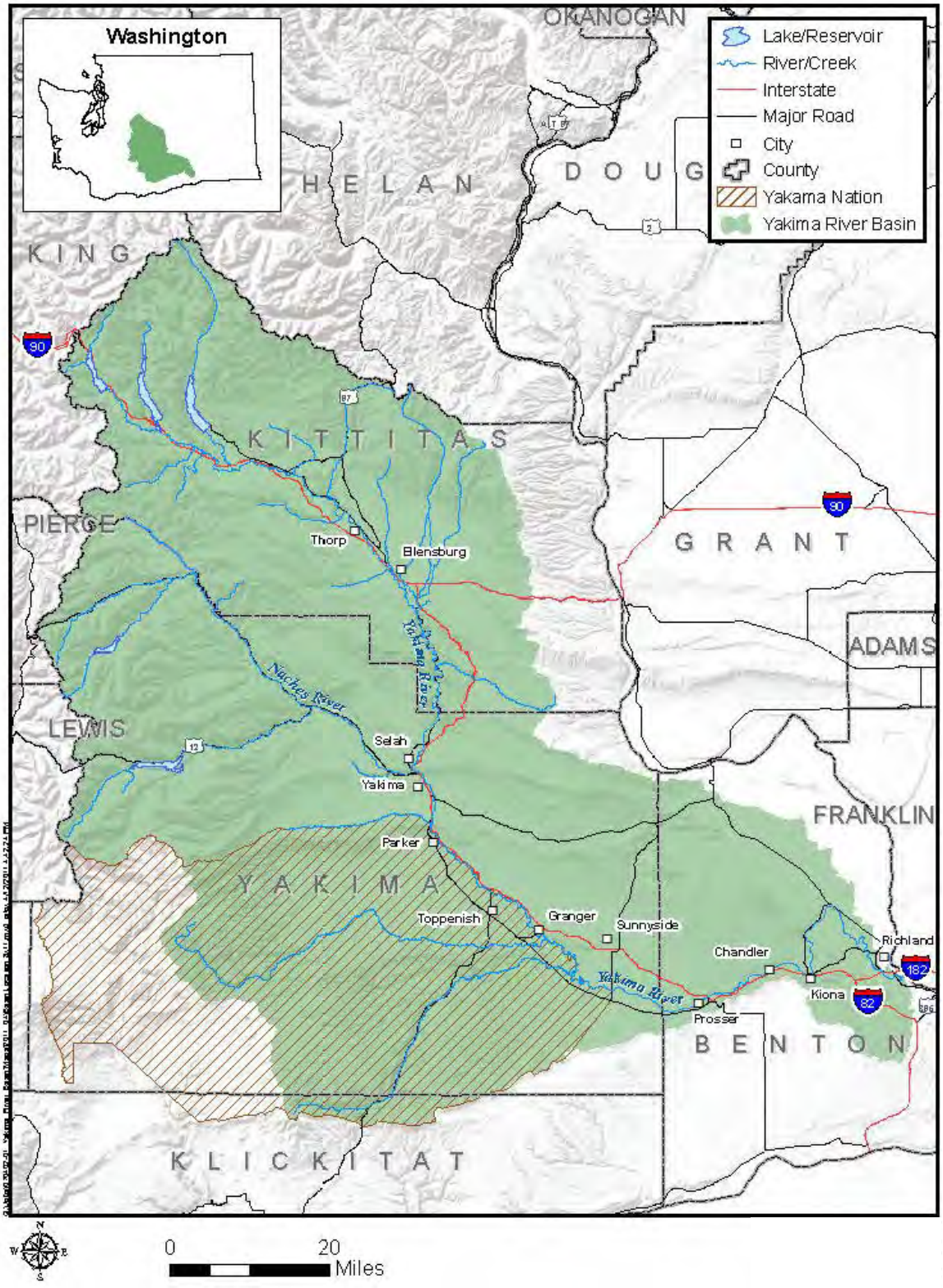

Figure 1. Location and general geography of the Yakima River Basin, central Washington State (Affected Area) (Reclamation and Ecology, 2011a).

Climate

Predictions by the Intergovernmental Panel on Climate Change (IPCC) (IPCC 2007, p.12) indicate that, in general, habitats and species will tend to migrate further north or higher in elevation in response to global climate change (Shafer *et al*, p. 18; Chambers and Pellant 2008, p.30). Species migration may not result from heat stress, *per se* but will more likely occur through such mechanisms as competitive exclusion or limitations resulting from unsuitable habitat (Shafer *et al*, p. 18; Chambers and Pellant 2008, p.30).

Climate change may affect the timing and quantity of precipitation. In general, as temperatures increase in the winter months, it is expected that less water will be stored as snow pack, thus increasing winter flows and decreasing the amount of water available for summer. Change in climate could shift the peak runoff period to a point earlier in the season, which would decrease stream flow in both regulated and unregulated river reaches and tributaries throughout the year. The Economic Development Group of Kittitas County states that "the agriculture of Kittitas County is largely affected by climate, water supply and drainage conditions rather than to soil types, that most agricultural crops are produced with supplemental irrigation supplied from three mountain reservoirs. Refilling of the reservoirs is dependent upon the timely melt of the mountain snowpack."

Figure 2 illustrates predicted changes in runoff associated with a 2° C change in temperature for the Naches River Basin. The climate in the Project area is described as moderately arid, with an annual average of 8.0 inches (20 cm) of precipitation and an average temperature of 17° C at Yakima. For Ellensburg, the average high temperature was 16 ° C and 8.89 inches (22 cm) of precipitation. Much of the annual precipitation comes in the form of snowfall, averaging 27.7 inches/ 70 cm at Ellensburg and 23.5 inches/ 60 cm at Yakima annually. However, the global surface in general is warming and this warming is predicted to continue into 2100.

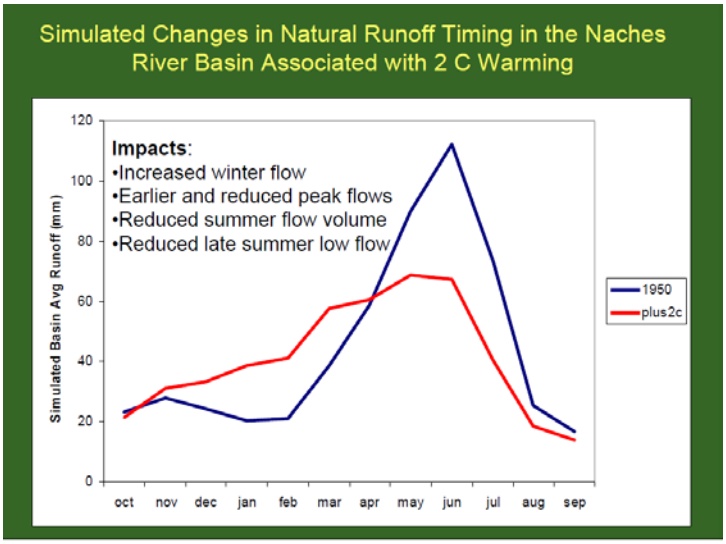

Figure 2. Predicted changes in runoff associated with 2° C change in temperature (Hamlet et al 2008)

Water Resources

Water Quality

Water quality throughout the basin has been degraded and numerous portions of the Affected Area are listed on the Washington State 303(d) lists for pollutants/contaminants, water temperature, and sediment. Every 2 years, Ecology publishes a list of "impaired water bodies," as required by section 303(d) of the Federal Clean Water Act. Much more detailed and complete discussions of the water quality throughout the basin are presented in the USGS report entitled "Surface-Water-Quality Assessment of the Yakima River Basin, Washington: Analysis of Available Water-Quality Data Through 1985 Water Year" (1991), in Volume I of the *Yakima River Basin Water Quality Plan* prepared by the Yakima Valley Conference of Governments (1995), and in the "Technical Report: Lower Yakima River Suspended Sediment Total Maximum Daily Load -Effectiveness Monitoring Report" (Ecology, 2006).

Aquifers

The Yakima River and its tributaries provide recharge to the groundwater system. Most of the water infiltrates into the shallow aquifers, where it is pumped by wells, captured in drains, or is returned to the surface water systems near the downstream end of each basin. Additional details regarding groundwater storage in the Yakima River basin can be found in the *Technical Report on Ground Water Storage Alternatives for the Yakima River Basin the Integrated Water Resource Management Alternative* (Golder Associates Inc., 2009).

Reservoir Water Storage and Releases

The peak/base flows and the drainage network in the Basin have been altered from historic conditions. Releases from the storage reservoirs of the Yakima River system are made for three purposes: (1) irrigation water demand, (2) flood control, and (3) instream flow requirements. Increased storage capacity is needed to meet current and future water demands, particularly in low water years.

Land use

Agriculture

The Yakima Valley is one of the largest agricultural producers in the state and contributes the largest economy to the state of Washington (Reclamation, 2002). Most crops in the basin are irrigated and include apples, cherries, pears, grapes and many other fruits plus a wide variety of vegetables, seeds, field crops, and cereal grains. Most crops grown in the valley require irrigation. Hay remains the largest cash crop in Kittitas County, estimated to have an annual value of more than $30 million (Economic Development Group of Kittitas County, 2011).

Low water years reduce the amount of water available to water right holders, including irrigation districts that do not hold senior water rights in the Yakima River Basin, resulting in a reduction of total crop yields in low water years.

Development

Approximately 1% of the 6,150 square miles of the Yakima River basin is developed. The cities of Cle Elum, Ellensburg, Selah, Yakima/Union Gap, Toppenish, Sunnyside, Grandview, and Prosser are the most urbanized areas. For 2009-2010, Washington State was fifth in the nation for increased new construction, with an increase of 21.6 %. In 2010, Benton, Kittitas, Klickitat, and Yakima counties issued a total of 2,171 new building permits (US Census Bureau, 2010).

Between 2000 and 2010, the Benton County population increased by an estimated 30, 425 people (14.24 %), Kittitas County by 7, 138 people (21.4 %), Klickitat County by 1,339 people (6.99 %) and Yakima County by 16,519 people (7.42 %) (U.S. Census Bureau, 2010).

V. FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

The information in this section is derived from the Yakima River Basin Water Enhancement Project CAR (USFWS 1996), the EIS for the Yakima River Basin Water Enhancement Project (USBR 1999), the Yakima River Basin Water Storage Feasibility Study CAR (USFWS, 2007), the Yakima River Basin Water Storage Feasibility Study (Reclamation, 2008a), and the Integrated Plan Draft PEIS (Reclamation and Ecology, 2011a).

Federally Listed Threatened and Endangered Species, Candidates and Species of Concern

Endangered Species

Gray wolf (Canis lupus)

The gray wolf is federally listed as endangered under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. § 1531 et seq.), in the western two-thirds of Washington. Protection of the gray wolf in portions of Idaho, Wyoming and Montana was re-instated under a court order on October 26, 2010 (75 FR 65574-65579). On May 5, 2011, the Service reissued the April 2, 2009, final rule that identified the Northern Rocky Mountain population of gray wolf as a DPS and delisted wolves in Idaho, Montana and parts of Oregon, Washington and Utah. On May 5, 2011 wolves were federally delisted in the eastern one-third of Washington (east of State Route 97 from the Canadian border to Highway 17, east of Highway 17 to State Route 395, and east of State Route 395 to the Oregon border). Gray wolves are currently protected under ESA in Kittitas, Klickitat and Yakima Counties.

The gray wolf is the largest wild canid in North America and has a ten to eighteen year life span. Washington's first fully confirmed wolf pack in many years was discovered in Okanogan County in July 2008 and the second was found in Pend Oreille County in 2009 and 2010. In 2011, the Teanaway pack was confirmed in the Teanaway River drainage in Kittitas County and the Smackout pack was confirmed in Stevens County; currently there are 5 known wolf packs in Washington (WDFW, 2011a).

Threatened Species

Bull Trout (Salvelinus confluentus)

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (Federal Registry Notice, 64 FR 58910). Bull trout in the Columbia River Distinct Population Segment were listed as threatened on June 10, 1998. The threatened bull trout occurs in the Klamath River Basin of south-central Oregon and in the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound and east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Cavender, 1978; Bond 1992; Brewin and Brewin, 1997; Leary and Allendorf, 1997).

Historically, bull trout occurred throughout the Yakima River basin. Although a large number of bull trout local populations are still widely scattered across the basin, currently they are fragmented into isolated local populations. Among the 12-16 local populations (there may only be 12 genetically distinct population and three others considered “unknown” but most are

isolated above impassible dams that only allow limited, one-way, downstream movement of individuals. Some populations are connected to only one or two other local populations. The main populations in the Naches River, Rattlesnake Creek, Bumping River, Crow Creek, American River, Kettle Creek and Union Creek exhibit nearly identical over wintering behavior in the mainstem Naches River (Mizell and Anderson, 2006). In addition, over-wintering occurs in several deep pools where the populations intermingle over the winter months, then separate-out for spawning.

Bull Trout Critical Habitat

The Affected Area is part of the Yakima River Basin critical habitat unit (CHU, Unit 11), as designated by the Service's October 18, 2010, final rule (75 FR 63898). The Yakima River CHU supports adfluvial, fluvial, and resident life history forms of bull trout. This CHU includes the mainstem Yakima River and tributaries from its confluence with the Columbia River to its headwaters at the crest of the Cascade Range. The Yakima River CHU is located on the eastern slopes of the Cascade Range in south-central Washington and encompasses the entire Yakima River basin located between the Klickitat and Wenatchee Basins.

A total of 1,177.2 km (731.5 mi) of stream habitat and 6,285.2 ha (15,531.0 ac) of lake and reservoir surface area in this CHU are designated as critical habitat. One of the largest populations of bull trout (South Fork Tieton River population) in central Washington is located above the Tieton Dam and supports the core area. This CHU supports two potential resident local populations identified in the U.S. Fish and Service's 2008 five year review (Service 2008, p. 6).

Overall, the general habitat conditions in the Yakima CHU show a similar pattern; lower reaches of the mainstem Yakima and its tributaries are fairly degraded, likely influenced by the high degree of development, roads, forestry, agriculture, irrigation diversions, grazing, mining and other infrastructure and land management activities. These reaches may also have 303(d) listed impairments of water quality, with warmer temperatures and lacking necessary instream flows being fairly common (Appendix A). In contrast, the upper reaches are generally of higher water quality and have less anthropogenic impacts; although, there is substantial variation in habitat conditions across the CHU.

Canada lynx (Lynx canadensis)

The lynx was classified as threatened on March 24, 2000 (65 FR 17 16053-16086) and Critical Habitat for the lynx was designated on 11/09/2006 71 FR 66008- 66061 and last revised on 02/25/2009 74 FR 8616 8702. The lynx is a medium-sized cat with long legs, large, well-furred paws, long tufts on the ears, and a short, black-tipped tail. The distribution of lynx in North America is closely associated with the distribution of North American boreal forest.

The range of lynx populations extends south from the classic boreal forest zone into the subalpine forest of the western United States, and the boreal/hardwood forest ecotone in the eastern United States. Forests with boreal features extend south into the contiguous United States along the North Cascade and Rocky Mountain Ranges in the west, the western Great Lakes Region, and northern Maine. Within these general forest types, lynx are most likely to persist in areas that receive deep snow and have high-density populations of snowshoe hares, the principal prey of lynx.

Ute ladies'-tresses (Spiranthes diluvialis)
The Ute ladies'-tresses are currently listed as a federally threatened species (USFWS, 1992) (57 FR 2048-2054). A range-wide review was conducted in 2005. Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial, terrestrial orchid with 7 to 32-inch stems arising from tuberous thickened roots. The flowering stalk consists of few too many small white or ivory flowers clustered into a spiraling spike arrangement at the top of the stem. The species is by whitish, stout flowers and it generally blooms from late July through August.

In Washington Ute ladies'-tresses occurs in Okanogan and Chelan Counties along stable riparian edges, gravel bars, old oxbows, high flow channels and moist to wet meadows along perennial streams. It typically occurs in stable wetland and seep areas associated with old landscape features within historical floodplains of major rivers, as well as in wetlands and seeps near freshwater lakes or springs. The Ute ladies'-tresses range in elevation from 720 to 1,830 ft in Washington to 7,000 ft in northern Utah. Nearly all occupied sites have a high water table (usually within 5 to 18 inches of the surface) that is augmented by seasonal flooding, snowmelt, runoff and irrigation.

Steelhead (Oncorhynchus mykiss)
A Final Rule determining that the steelhead was deserving of protected status was published on January 5, 2006 (71 FR 833-862).

Steelhead are capable of surviving in a wide range of temperature conditions. They do best where dissolved oxygen concentration is at least 7 parts per million. In streams, deep low-velocity pools are important wintering habitats. Spawning habitat consists of gravel substrates free of excessive silt.

In the United States, steelhead trout are found along the entire Pacific Coast. Worldwide, steelhead are naturally found in the Western Pacific south through the Kamchatka peninsula. They have been introduced worldwide. In recent years, some populations have shown encouraging increases in population size while others have not. Salmonid species on the west coast of the United States have experienced dramatic declines in abundance during the past several decades as a result of human-induced and natural factors.

Unlike other Pacific salmonids, they can spawn more than one time (called iteroparity). Migrations can be hundreds of miles. Young animals feed primarily on zooplankton. Adults feed on aquatic and terrestrial insects, mollusks, crustaceans, fish eggs, minnows, and other small fishes (including other trout).

Distinct steelhead populations are found in Satus Creek, Toppenish Creek, and the Naches and upper Yakima basin (Reiss *et al*., 2011). Together, these four populations comprise the Yakima "Major Population Group (MPG) I the Mid-Columbia "Distinct Population Segment" (DPS). The Ahtanum steelhead are grouped (genetically) with the Naches population.

Steelhead Critical Habitat
Critical habitat for 10 west coast steelhead DPSs was designated on September 2, 2005.

Grizzly Bear (Ursus arctos horribilis)
Grizzly bears reach weights of 180-680 kg (400-1,500 lb) and while the study of the very rugged and remote habitat in the north Cascades indicates that this ecosystem is capable of supporting a self-sustaining population of grizzlies, only a "remnant" population remains, incapable of enduring without active recovery efforts. The population is estimated to be fewer than 20 animals within the 9,500 sq mi North Cascades recovery zone (limited to the U.S.) and the bears in this ecosystem are warranted for endangered status. In 1991, the Service first issued a warranted but precluded finding to up-list the north Cascades recovery zone population to endangered status.

Marbled Murrelet (Brachyramphus marmoratus)
On January 21, 2010, the Service determined that the Washington Distinct Population Segment (DPS) was in fact a DPS and that the murrelet was still deserving of federal protection due to remaining threats (75 FR 3424-3435). The marbled murrelet is a small Pacific seabird belonging to the family Alcidae. They are fast fliers with rapid wing beats and short wings. The breeding range of the marbled murrelet extends from Bristol Bay, Alaska, south to the Aleutian Archipelago, northeast to Cook Inlet, Kodiak Island, Kenai Peninsula and Prince William Sound, south coastally throughout the Alexander Archipelago of Alaska, and through British Columbia, Washington, Oregon, to northern Monterey Bay in central California. Birds winter throughout the breeding range and also occur in small numbers off southern California.

Marbled murrelets are long-lived seabirds that spend most of their life in the marine environment, but use old-growth forests for nesting. Courtship, foraging, loafing, molting, and preening occur in near-shore marine waters. Throughout their range, marbled murrelets are opportunistic feeders and utilize prey of diverse sizes and species. They feed primarily on fish and invertebrates in near-shore marine waters although they have also been detected on rivers and inland lakes.

The amount of suitable habitat has continued to decline throughout the range of the marbled murrelet, primarily due to commercial timber harvest. The precise amount of suitable murrelet habitat within the listed range is unknown. Threats include loss of habitat, predation, gill-net fishing operations, oil spills, marine pollution, and disease. Recent reviews have concluded that the risk of predation is currently a larger threat than previously considered

Northern Spotted Owl (Strix occidentalis caurina)
The spotted owl was listed as threatened on June 26, 1990 due to widespread loss and adverse modification of suitable habitat across the owl's entire range and the inadequacy of existing regulatory mechanisms to conserve the owl (USFWS, 1990). At the time of listing, small and isolated populations vulnerable to extinction, predation and competition were also identified as threats.

On April 20, 2011 the Service announced a public comment period for a five-year review of the status of the northern spotted owl (NSO) (76 FR 22139 22140) and on April 22, 2011 the comment period for the draft revised Recovery Plan was announced (76 FR 22720 22721). On January 15, 1992, the Service designated spotted owl critical habitat within 190 CHUs which

encompassed nearly 6.9 million acres of Federal lands in California, Oregon, and Washington (USFWS, 1992).

Approximately 7.4 million acres of suitable habitat were estimated to exist on Federal lands in 1994. A recent trend analysis indicated an overall decline of approximately 2 percent in the amount of suitable habitat on Federal lands within the Northwest Forest Plan area between 1994 and 2003. There are insufficient data to determine the amount and trend in suitable habitat on non-Federal lands.

Since listing of the northern spotted owl, recent reviews have more specifically identified competition with the barred owl (*Strix varia*), and fire in the relatively dry East Cascades and Klamath provinces of California and Oregon as greater threats than previously considered. New potential threats of unknown magnitude to the subspecies and its habitat include West Nile virus and the sudden oak death tree disease, respectively. In 1992, the Service designated NSO within California, Oregon, and Washington.

The northern spotted owl is one of three spotted owl subspecies: northern, California (*Strix occidentalis occidentalis*), and Mexican *(Strix occidentalis lucida*). The distribution of the northern subspecies includes southwestern British Columbia, western Washington and Oregon, and northwestern California south to Marin County. The southeastern boundary of its range is the Pit River area of Shasta County, California.

The spotted owl is a relatively long-lived bird; produces few, but large young; invests significantly in parental care; experiences later or delayed maturity; and exhibits high adult survivorship. Spotted owls are territorial; however, home ranges of adjacent pairs can overlap. Home range size varies by province and generally increases from south to north.

Spotted owls are mostly nocturnal, but they may forage opportunistically during the day. Northern flying squirrels (*Glaucomys sabrinus*) and woodrats (*Neotoma* spp.) are usually the predominant prey. Other prey species such as the red tree vole (*Arborimus longicaudus),* red-backed voles (*Clethrionomys gapperi),* mice, rabbits and hares, birds, and insects may be seasonally or locally important.

Northern Spotted Owl Critical Habitat

Northern spotted owls generally inhabit older forested habitats because they contain the structural characteristics required for nesting, roosting, and foraging. Specifically, northern spotted owls require a multi-layered, multi-species canopy with moderate to high canopy closure. The stands typically contain a high incidence of trees with large cavities and other types of deformities; large snags (standing dead trees); an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly.

The Service (2008) revised spotted owl critical habitat into 29 units, comprised of 174 sub-units, on approximately 5,312,300 acres of Federal lands in California, Oregon, and Washington in a geographic manner designed to protect clusters of reproducing spotted owls and facilitate demographic interchange. Currently, critical habitat is in the process of revision to address new threats and to incorporate emerging science regarding habitat management in fire-prone areas. This final rule is anticipated to be issued in November 2012.

Designation of critical habitat serves to identify those lands that are necessary for the recovery of the listed species. The Service's primary objective in designating critical habitat was to identify capable and existing spotted owl habitat and highlight specific areas where management of the spotted owl and its habitat should be given highest priority.

The current level of survey coverage and effort are insufficient to produce reliable population estimates. Consequently, other indices, such as demographic data, are used to evaluate the current condition of the northern spotted owl population. Analysis of demographic data has provided estimates of population trends. Most recent meta-analysis for the listed range of the subspecies indicates declines in populations in some areas.

Candidate Species

Greater Sage-grouse (Centrocerus urophasianus)

A large, gallinaceous species up to 30 inches in length and two feet tall, weighing from two to seven pounds, and has a long, pointed tail with legs feathered to the base of the toes. In eastern Washington, the sage-grouse is found from 1,000 to 4,000 feet in elevation (the highest point on the Yakima Training Center). In other states it is found in open sagebrush plains from 4,000 to over 9,000 feet in elevation, and is an omnivore, feeding on soft plants, primarily sagebrush, and insects.

The historic range of the sage-grouse included Washington, Oregon, eastern California, Nevada, Idaho, Montana, Wyoming, western Colorado, Utah, South Dakota, North Dakota, Kansas, Oklahoma, Nebraska, New Mexico, Arizona and the Canadian provinces of British Columbia, Alberta and Saskatchewan. They are no longer found in Nebraska, Kansas, Oklahoma, New Mexico, Arizona, and British Columbia.

The distribution of greater sage-grouse has contracted, most notably along the northern and northwestern periphery and in the center of the historic range. Range-wide estimates of sage-grouse abundance prior to European settlement in western North America vary, but consensus estimate is that there may have been about 1.1 million birds in 1800. The 1998 range-wide spring population numbered about 157,000 sage-grouse. More recent estimates put the number of sage-grouse range-wide at roughly between 100,000 and 500,000 birds.

Recent surveys indicate there are two relatively isolated sage-grouse populations remaining in Washington. One population is found in Douglas and Grant counties, predominantly on private land. The other population is found on the federally managed Yakima Training Center in Kittitas and Yakima counties which, together with the Hanford site, comprise the largest block of shrub-steppe remaining in Washington. The Yakima Training Center borders the extreme eastern end of the potential Wymer Reservoir footprint. These sage-grouse populations are isolated from surrounding populations in Idaho and Oregon (Hays *et al.*1998). Additional information about sage grouse can be found within the Sage Grouse Recovery Plan (Stinson and Hays, 2004.).

Greater Sage-grouse Habitat

In the Yakima Basin, sage-grouse use shrub-steppe and grassland areas to a lesser extent for all of their life history. Loss of this shrub-steppe would exacerbate ongoing losses of habitat in the area and impact movement corridors for the sage-grouse; particularly within the footprint of the proposed Wymer Reservoir.

Sage-grouse moving west from the Yakima Training Center to the canyon would be required to migrate to the north or south of the reservoir (Reclamation and Ecology, 2008a). The reservoir could cause some loss of movement corridors and may further isolate and fragment populations and decrease and/or eliminate suitable habitats.

Mardon Skipper (Polites mardon)

The Mardon Skipper is a small tawny-orange butterfly dependent on native, fescue-dominated grasslands in Washington, Oregon, and northwest California. It has a stout, hairy body and the upper surface of both wings is orange with broad dark borders. The wings from below are light tan-orange with a distinctive pattern of light yellow to white rectangular spots. It is found in prairie and meadow habitat with abundant Idaho fescue (*Festuca idahoensis*).

Mardon skippers complete one life cycle annually, and in Washington adults emerge from chrysalids between May and July for a month-long flight period. The historic range and abundance of the Mardon skipper is not precisely known because systematic and quantitative studies were not conducted prior to 1980. Historically, specimens of the butterfly were collected in three counties in Washington (Thurston, Klickitat, and Yakima).

Basalt Daisy (Erigeron basalticus)

A tap-rooted perennial herb with one to several sprawling stems per plant. The flowers are typically daisy-like, with white to lilac ray flowers, about ¼ inch long, surrounding a cluster of small disk flowers. Basalt daisy has been observed in an approximately 20 square-mile area in and adjacent to Yakima Canyon in Yakima and Kittitas counties, Washington. It grows in crevices in basalt cliffs on canyon walls, with northerly, easterly and westerly aspects. Elevations range from1250 to 1500 feet. The habitat is exclusively on basalt cliffs along the Yakima River and Selah Creek, both of which have cut through basalt from the Yakima Basalt Formation. The basalt daisy occurs at several locations within the Yakima River Basin (WNHP, 2007).

Umtanum Desert Buckwheat (Eriogonum codium)

Umtanum desert is a low caespitose (shrublike, multi-stemmed), herbaceous perennial buckwheat that is endemic to a very narrow range in Benton County in south central Washington. The only known population of this species occurs at elevations ranging between 1100 and 1320 feet on flat to gently sloping near the top of the steep, north-facing basalt cliffs over-looking the Columbia River.

Northern Wormwood (Artemisia campestris ssp. borealis var. wormskioldii)

Northern wormwood is a low growing, tap rooted, biennial or perennial shrub in the Asteraceae (composite) plant family. Northern wormwood is 20 to 60 inches tall with greenish to red stems covered by stiff hairs. Northern wormwood generally grows in arid shrub steppe environments. Plants grow within the flood plain of the Columbia River and are generally sparsely distributed covering less than 1% of the suitable habitat at known sites. Northern wormwood is a narrowly endemic species that has only two populations, which occur in Grant and Klickitat Counties.

In addition to direct loss of habitat as a result of dam construction, the manipulation of water flows by hydroelectric dams threatens this variety. The severity of spring floods has been reduced or eliminated in most years. Altered water regimes, as well as recreational uses and grazing, have allowed nonnative plants to invade both sites. Threats that are increasingly significant in smaller populations are related to the loss of genetic variability due to random changes in gene frequencies (genetic drift). Loss of genetic variability can affect disease resistance, response to climatic change, and reproductively compatible gene combinations (genotypes) (USFWS, 1999b).

Oregon Spotted Frog (Rana pretiosa)

The Oregon spotted frog is named for the black spots that cover their head, back, sides, and legs. The dark spots have ragged edges and light centers, which are usually associated with tubercles or raised areas of skin; these spots become larger and darker and the edges become more ragged with age. This species is the most aquatic native frog in the Pacific Northwest. It is almost always found in or near a perennial body of water that includes zones of shallow water and abundant emergent or floating aquatic plants, which the frogs use for basking and cover.

The Oregon spotted frog has been lost from at least 78 % of its former range. Precise historic data is lacking, but this species has been documented in British Columbia, Washington, Oregon, and California. It is believed to have been extirpated (locally extinct but exists elsewhere) from California. It is currently known to occur from extreme southwestern British Columbia, south through the eastern side of the Puget/Willamette Valley Trough and the Columbia River Gorge in south-central Washington, to the Cascades Range, to at least the Klamath Valley in Oregon.

Wolverine (Gulo gulo)

The wolverine is the largest terrestrial member of the weasel family, Mustelidae. Adult males weigh 12 to 18 kilograms (26 to 40 pounds) and adult females weigh 8 to 12 kilograms (17 to 26 pounds). The wolverine resembles a small bear with a bushy tail. It has a broad, rounded head; short, rounded ears; and small eyes. Each foot has five toes with curved, semi-retractile claws used for digging and climbing.

Wolverines are opportunistic feeders and consume a variety of foods depending on availability. They primarily scavenge carrion, but also prey on small animals and birds, and eat fruits, berries, and insects. Wolverines have an excellent sense of smell that enables them to find food beneath deep snow. In North America, wolverines occur within a wide variety of habitats, primarily boreal forests, tundra, and western mountains throughout Alaska and Canada; however, the southern portion of the range extends into the contiguous United States.

Currently, wolverines appear to be distributed in two regions in the lower 48 states: the northern Cascades in Washington, and the northern Rocky Mountains in Idaho, Montana, and Wyoming. Wolverines are thought to have been extirpated in historical times from the Sierra Nevada and the southern Rocky Mountains.

Migratory Birds

Bald Eagle (Haliaeetus leucocephalus)[1]:

Suitable habitat includes those areas that are close to large bodies of water and provide a substantial food base such as along rivers with anadromous fish, good populations of resident fish, abundant waterfowl and good mammal populations. In the Yakima River Basin, bald eagles and bald eagle nesting sites are often prevalent along the shores of reservoirs and rivers. Territory size and configuration are influenced by the availability of perch trees for foraging, quality of foraging habitat and distance of nests from water supporting adequate food supplies. Bald eagles are sensitive to a variety of human recreational and development activities. Human disturbance is particularly disruptive during the nesting season.

For a list of species of concern within the Affected Area, please refer to Appendix B.

Fisheries Resources

Reservoir operations and storage dams have created and maintained migration barriers isolating native anadromous and resident fish populations from habitat access. Flow regulation has blocked access to side-channel habitat or tributaries. Aquatic habitat elements such as substrate embeddedness, large woody debris, winter habitat conditions, pool frequency and quality, reduced flows, off-channel habitat, and loss of refuge have been diminished in quantity, quality, and distribution throughout the basin. Average wetted width/depth ratios, streambank conditions, and floodplain connectivity have all been reduced or eliminated in much of the basin.

Anadromous Fish

The fisheries resources of the Yakima River system evolved with the Basin's geology, climate, and dynamic hydrologic cycle. About 800,000 salmon and steelhead migrated annually into the Basin prior to 1890 (McIntosh *et a*l., 1994). These included spring, summer and fall Chinook salmon (*Oncorhynchus tschawytscha)* sockeye salmon (*Oncorhynchus nerka),* coho salmon (*Oncorhynchus kisutch),* and summer steelhead (*Oncorhynchus mykiss)* (DOE, 1996). Wild sockeye, summer Chinook and coho salmon are now apparently extinct in the Basin.

Anadromous salmonids 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). There is only one nonsalmonid anadromous fish species currently using the Yakima basin—the Pacific lamprey, which is a Federal species of concern. Listed species are discussed in Section 3.10, Threatened and Endangered Species.

Inadequate fish passage and protective facilities at many diversion sites have been a major factor in anadromous fish declines in the Yakima River basin. Factors within the basin that have contributed to population declines include: 1) total blockage of a substantial amount of spawning and rearing habitat; 2) dewatering of spawning and rearing habitat; 3) overharvest of returning adults; 4) construction of diversion dams without fish ladders; 5) construction of diversion canals

[1] The bald eagle was delisted from as a federally listed threatened species under the Endangered Species Act on August 8, 2007. It is still protected by Federal law under the Migratory Bird Treaty Act and the Bald Eagle Protection Act.

without adequate fish protection measures, 6) elimination of braids and natural floodways by diking and channelization, and 7) lack of fish passage.

***Spring Chinook (Oncorhynchus tshawytscha*)**
The upper Yakima, Naches and American River basins support spawning groups that compose the Yakima River basin spring Chinook population. About 60 to 70 percent of the spring Chinook 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. Variability in run timing is influenced by high and low flows. Run timing for spawning runs of all salmon and steelhead is delayed during years of high flow and accelerated in years of low flow (Reclamation and Ecology, 2008a). 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, 2008a).

***Fall Chinook (Oncorhynchus tshawytscha*)**
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.

In addition, there is 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, 2008a). 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 (Oncorhynchus kisutch)
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. Factors contributing to the extirpation of coho salmon from the Yakima basin include the construction of dams on the Columbia River and overharvest of wild stocks. The Yakama Nation releases approximately 1 million coho smolts in the Yakima basin annually (Newsome, personal communication, 2009). 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. Currently, coho salmon enter the Yakima River in the fall. Spawning occurs soon afterward; the eggs incubate over the winter and hatch in the spring. After the fry emerge from the gravel, the juveniles rear in the stream until the following spring when they outmigrate as 1-year-old smolts (Reclamation and Ecology, 2008a). 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, 2008a).

Sockeye (Oncorhynchus nerka)

The four natural glacial lakes in the Yakima River basin historically supported sockeye salmon. Sockeye salmon runs in the Yakima River basin were historically larger than any other runs in the Columbia River Basin in terms of numbers (Reclamation and Ecology, 2008a). The construction of crib dams at the outlet of the lakes contributed to the extirpation of the species from the basin in the early 1900s. The reintroduction of sockeye salmon into Cle Elum Reservoir began in 2009 with the release by the Yakama Nation of 500 pairs of adult sockeye (Wenatchee and Lake Osoyoos stocks) trapped at Priest Rapids Dam (Reclamation and Ecology, 2011a).

Pacific Lamprey (Lampetra tridentata)

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). Pacific Chapter 3 Affected Environment November 2011 3-45 lamprey are very rare in the Yakima River basin and little is known about their life history, historic distribution, or current limiting factors; therefore, the Yakama Nation considers reintroduction of this species a long-term objective. 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).

Resident Fish

The adverse conditions for anadromous species described above also affect populations of resident fish such as bull trout and their habitat. Historic bull trout abundance is not well defined in the basin, but there is recognition that its historic distribution was broader than is presently observed, with many distinct populations. The basin was recently designated as critical bull trout habitat and there is a need to reinstitute year-round connectivity of bull trout habitat between lakes and reservoirs and the mainstem of rivers, including the Columbia River resident native salmonids that currently exist in streams and lakes of the upper Yakima and Naches sub-basins.

Although bull trout tend to exhibit several different life history strategies, they will be included in the resident fish analysis of this CAR.

Several factors have contributed to the decline of bull trout and include:

- Forest management, livestock grazing, agricultural practices, and residential and urban development have all had serious adverse impacts to the bull trout in the Basin.
- Fisheries management, introduction and spread of non-native species, predation by warm-water predators, and the decline and loss of anadromous fish populations have seriously and adversely impacted bull trout populations in the Basin.

In addition to bull trout, westslope cutthroat trout (*Oncorhynchus clarki*), rainbow trout (*Oncorhynchus mykiss*), kokanee (*Oncorhynchus nerka*), mountain whitefish (*Prosopium williamsoni*) and pygmy whitefish (*Prosopium coulteri*) currently reside in streams and lakes in the Yakima basin (Pearson *et al*. 1998 and WDFW 1998). Eastern brook trout (*Salvelinus fontinalis*) a non-native (introduced) salmonid is also present. Of the species listed above, those of special concern include bull trout (listed as federally threatened), westslope cutthroat trout, and pygmy whitefish (state sensitive).

Westslope cutthroat appear to be fairly abundant and widely distributed within the Basin, particularly in the upper reaches (higher elevations) of tributaries to Keechelus, Kachess, Cle Elum, Rimrock, Clear, and Bumping Reservoirs, as well as in the upper Yakima River and its tributaries; and the Naches River and its tributaries. Cutthroat trout are more common and numerous in the Naches subbasin than in the upper Yakima subbasin.

Thirty-seven resident non-salmonid species are present in the Yakima Basin (Pearsons *et al.*, 1998). The most abundant non-salmonids in the upper Yakima 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 columbianus*), and several sculpin species, including mottled, torrent, Piute, and shorthead sculpins (*Cottus sp.*). These fish provide an important component of the aquatic environment by serving as forage for other game and food fish. Burbot (*Lota lota*), a native species, is also a fish species present in the Keechelus, Kachess, Cle Elum, and Bumping Reservoirs. For a complete fish species list for the basin refer to Pearsons *et al*., 1998.

Three other species, although not as abundant as those listed above, but important due to their status are the mountain sucker (*Catostomus platyrhynchus*) (a state candidate species), the Pacific lamprey (a federal species of concern), and the pygmy whitefish (*Prosopium coulteri*) (state sensitive). Mountain suckers occur within the basin and it is possible that lamprey do as well, although few have been observed in the Yakima River.

Terrestrial Resources

Wildlife

An array of wildlife inhabit the Affected Area including mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), Townsend ground squirrel (*Citellus townsendi*), black-tailed jackrabbit (*Lepus californicus*), pallid bat (*Antrozous pallidus*), small-footed myotis bat (*Myotis subulatus*), and the Merriam shrew (*Sorex merriami*). Elk (*Cervus canadensis*), coyote (*Canus latrans*), and badger (*Taxidea taxus*) are some of the mammals that utilize shrub-steppe habitat.

Bird species utilizing shrub-steppe habitat include western kingbird (*Tyrannus verticalis*), western meadowlark (*Sturnella neglecta*), and mourning dove (*Zenaida macroura*). Some of the reptiles and amphibians found in shrub-steppe habitat include western rattlesnake (*Crotalus virdis*), Great Basin spadefoot toad (*Spea intermontana*) and northern sagebrush lizard (*Sceloporus graciosus*) (USFWS, 1996).

Bird species may include, golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), short-eared owl (*Asio flammeus*), long-billed curlew (*Numenius madagascariensis*), loggerhead shrike (*Lanius ludovicianus*), greater sage-grouse (*Centrocerus urophasianus*), sage sparrow (*Amphispiza belli*), Brewer's sparrow (*Spizella breweri*), and sage thrasher (*Oreoscoptes montanus*) to name a few. In addition, the Priority Habitats and Species Database (WDFW, 2006) show that the Yakima River basin provides important seasonal habitat for the bald eagle, including nesting and over-wintering habitat.

Typical wildlife species that may utilize the wetland and riparian habitats within the Affected Area include, beaver (*Castor canadensis*), mink (*Mustela vison*) and river otter (*Lutra canadensis*). Reptile and amphibian species found in these habitats include, western painted turtle (*Chrysemys picta*), and spotted frog (*Rana pretiosa*). Common avian species include, Wilson's phalarope (*Phalaropus tricolor*), belted kingfisher (*Megaceryle alcyon*), peregrine falcon (*Falco peregrinus*), and hairy woodpecker (*Picoides villosus*). Species of waterfowl that utilize the wetland and riparian habitats within the Affected Area include, mallard (*Anas platyrhynchos*), and American wigeon (*A. Americana*) (USFWS, 1996).

Northern spotted owls exist in old growth forest habitat on the perimeter of Bumping Lake Reservoir and recently WDFW staff observed a golden eagle nesting there (Clausing, T., personal communication, 2011). The Wymer Reservoir site is unique as it situated within bighorn sheep winter range and Townsend ground squirrel burrows, golden eagle and ferruginous hawk nests have been observed also (cite). In addition, the habitat within and near the Wymer site provides habitat for short-eared owl, long-billed curlew, loggerhead shrike, sage sparrow, brewer's sparrow, sage thrasher, black-tailed jackrabbit, Merriam's shrew, mule deer, pallid bat and small-footed myotis bat. About half of the site is core habitat for greater sage-grouse also serves as peripheral habitat for white-tailed jackrabbit (*Lepus townsendii*) (Johnson and Cassidy 1997; Stinson and Hays, 2006).

For a more comprehensive list of wildlife species that might be found within the basin, please refer to Appendix A.

Riparian and Wetland Resources

Riparian areas are currently estimated to encompass less than 1 percent of the land base in the Pacific Northwest (USFWS, 1996). Riparian habitats contain elements of both aquatic and terrestrial ecosystems which mutually benefit each other. They generally occur as relatively narrow linear units along aquatic habitats. Riparian zones typically include wetlands, such as palustrine emergent, palustrine forested, and palustrine scrub-shrub wetlands, riverine and in some cases lacustrine habitats (Cowardin, 1979). Riparian areas also include forested and scrub-shrub habitats that are too dry to be classified as wetlands, gravel bars, and other stream related habitats and vegetation.

Large-scale habitat conversion and degradation has resulted from vegetation removal and increased abundance of noxious weeds. Riparian cottonwood and willow dependence on shallow alluvial groundwater make them extremely susceptible to water table changes (Amlin and Rood, 2002; Rood *et al*., 2003). Cottonwood forests, one of the most important features of interior riparian wetlands, have been reduced in extent and quality.

Existing riparian conditions in the Yakima River basin vary, ranging from severely degraded to high quality. Upland riparian forests found in the Affected Area typically have an overstory of black cottonwood (*Populus balsamifera spp. Trichocarpa*) however, cottonwood recruitment has declined significantly, having significant long-term secondary impacts to wildlife habitat as this resource declines in area and quality. Regardless, the cottonwood forest in the upland riparian zone in a sixty mile reach[2] of the Yakima River was determined to be 3,704 acres in area (Elliott, 2008; Reclamation 2007).

The most significant impact to wetlands has been the modification of the historic hydrograph due to water storage facilities located upstream from the Affected Area (e.g., Bumping, Rimrock, Keechelus, Kachess, and Cle Elum Lakes (Reclamation, 2007). In addition, several miles of the Yakima River above its confluence with the Columbia River are subject to inundation by Lake Wallula, an impoundment created by the Army Corps of Engineer's operation of McNary Dam.

Additional losses have been attributed to agriculture conversion including grazing; filling for solid waste disposal, road construction and commercial, residential and urban development; construction of dikes, levees and dams for flood control, water supply and irrigation; discharges of materials, hydrologic alteration by canals, drains, spoil banks, roads and other structures; and groundwater withdrawal. Aside from direct losses in the quantity of wetlands, many wetlands have also been reduced in quality from the above factors.

Wetlands in the Yakima River basin provide an array of functions, such as important habitat for fish and wildlife, groundwater recharge, floodwater storage, nutrient uptake, and recreational opportunities. Because the Affected Area is mostly situated in a semi-arid environment, wetlands are extremely important to the survival of numerous wildlife species as they provide some of the best vegetative growth for food and cover, invertebrate production and water (USFWS, 1996).

[2] The subject river reach lies between Ahtanum Creek and Prosser (i.e., approximately eighteen miles below the confluence of Satus Creek.

Wetlands within the Yakima River floodplain and the basin have decreased in extent and quality. Alternation of riparian habitat within the floodplain began with the development of irrigated agriculture and changes in the regulation of river flows (YBFWRB, 2004). This development has altered the river's historic hydrograph and, along with road and levee development and land conversion, has resulted in separation of the river from its historic floodplain. These changes alter vegetation communities, the deposition and breakdown rates of leaf litter on floodplains that influence habitat conditions after inundation, and lead to significant declines in macroinvertebrate diversity and density (Boulton and Lloyd, 1992).

Shrub-Steppe and Grasslands

Prior to European settlement, shrub-steppe habitat was found in a nearly contiguous 10.4 million acre tract that occupied nearly all of eastern Washington (Dobler, 1990). Since that time, shrub-steppe habitat in eastern Washington and the Basin has declined significantly in both area and quality. Young (1976) calculated that this habitat covers 2,000,000 acres within the Basin.

An estimated 2,900 miles of rangeland exists in the Basin (YBFWRB, 2004). However, this habitat has undergone significant losses and degradation and is now listed as an endangered ecosystem in Washington (Noss *et al*., 1995). Dobler (1990) calculated that roughly 60 percent of the historical, native shrub-steppe habitat in Washington has been converted to other uses. Additionally, changes have occurred to the remaining habitat including heavy grazing from livestock, altered fire frequencies, exotic species invasion and off-road vehicle use.

Shrub-steppe lands provide very important habitat for a number of species of plants and animals, many of which are in decline. Vegetation types that make up shrub-steppe habitat are often dominated by big sagebrush as the principal shrub and bluebunch wheatgrass (*Pseudoroegneria spicata*) as the principal grass (Daubenmire, 1970). Much smaller amounts of gray rabbitbrush (*Chrysothamnus nauseosus*) and green rabbitbrush (*Chrysothamnus viscidiflorus*), spiny hopsage (*Grayia spinosa*), three-tip sage (*Artemisia tripartita*) and horsebrush (*Tetradymia canescens*) may occur in the shrub layer. Cheatgrass (*Bromus tectorum*), an exotic annual, has become widespread throughout the region. In some areas it has replaced the native grass species amid the native shrubs and forbs and in other areas shrubs are completely absent and cheatgrass is essentially the only grass species that occurs.

Forests

Forests of ponderosa pine, Douglas fir, western larch, white fir, and lodgepole pine cover approximately 2,200 square miles (570,000 hectares) (YBFWRB, 2004). Primary landowners include the U.S. Forest Service, Yakama Nation, American Forest Resources, Boise-Cascade, and Plum Creek. These forests provide habitat for many of the wildlife species found in the Basin.

Agricultural Lands

Agricultural Lands currently cover about 1,000 sq miles (259,000 hectares) and crops include apples, hops, grapes, cherries, mint, forage crops, dairy products, and beef cattle (YBFWRB, 2004). Although not often thought of as habitat, agricultural lands may provide valuable habitat for many species.

VI. FISH AND WILDLIFE CONCERNS AND PLANNING OBJECTIVES

Fish and wildlife resources of concern and of major Federal interest include bull trout, bull trout critical habitat, northern spotted owls, and northern spotted owl critical habitat, critical habitat for Steelhead, and critical habitat for sage-grouse. These species and habitats, to varying degrees, are dependent on areas within the Affected Area that may be beneficially or negatively impacted as a result of the Integrated Plan.

Goals

The goals of the Integrated Plan were generated by the YRBWEP work group and were developed with the objective to protect, mitigate, and enhance fish and wildlife habitat; provide increased operational flexibility to manage instream flows to meet ecological objectives, and improve the reliability of the water supply for irrigation, municipal supply and domestic uses; the Service served as member of the workgroup. The Integrated Plan is the Action Alternative, which consists of the seven elements identified by the workgroup to meet the current and future demands of the basin.

Planning Objectives

The primary planning objective of the Service is recovery and mitigation of habitat supporting species of major Federal interest. The Service recognizes that a great deal of time was spent amongst the Yakama Nation, local, state, and federal resource agencies and the Service, to identify solutions for fish and wildlife resources within the Yakima Basin. The Integrated Plan is a proposal for meeting multiple water resource needs in the basin, including resource protections. The Service has identified two overarching planning objectives of this CAR:

1. To continue to work within the intent of the Yakima River Basin Study workgroup and;

2. To continue to provide increased potential for recovery of endangered and threatened species within the Yakima River Basin, while not jeopardizing any listed species; particularly bull trout and northern spotted owls.

VII. THE PROPOSED ALTERNATIVES

The EIS evaluated impacts associated with and without the Integrated Plan at a programmatic level; particular attention was given to benefits associated with changes in river operations/habitat constraints and fish resources. The Service will use the information provided over the last several years to compare the existing conditions with the Action Alternative to identify potential impacts/benefits associated with the project at the programmatic level.

No Action Alternative
Under the No Action Alternative, the seven elements within the Integrated Plan would not be implemented. The No Action Alternative includes current and future activities that are slated to occur in the near term independent of the Integrated Plan (see Section II – On-going projects). The No Action Alterative represents the foreseeable future if no action is taken and Reclamation continues with current operations, additional storage facilities are not built, and no conservation actions occur beyond what is on-going.

In addition, during the DEIS process the YRBMWP workgroup determined that implementation of the Integrated Plan has potential to significantly increase benefits to fish and wildlife resource in the Affected Area when compared to the No Action Alternative (existing and future conditions without the project); however some exceptions may exist for Bull Trout.

Action Alternative
The Integrated Plan is the Action Alternative. The Action Alternative is intended to begin the process of restoring ecological functions in the Yakima River system and provide more reliable and sustainable water resources for the health of the riverine environment, agriculture, and municipal and domestic water needs. The Integrated Plan is presented as an integrated package of projects to provide a comprehensive approach to meeting current complex water needs, while anticipating increased water demands and changes in water supply related to climate change.

Implementing of all the elements of the Integrated Plan is expected to result in greater benefits to natural resources but only implemented using a balanced approach. The Integrated Plan includes seven elements to address habitat, system modifications, and water supply and includes:

1. Reservoir Fish Passage
2. Structural and Operational Changes to Existing Facilities
3. Surface Water Storage

4. Groundwater Storage
5. Habitat Protection and Enhancements
6. Enhanced Water Conservation
7. Market Reallocation

The Fish and Wildlife Coordination Act establishes fish and wildlife conservation as a "coequal" objective in water resource development projects. This CAR assumes implementation of all elements will occur in phases and in compliance with NEPA and ESA throughout each phase/project-level EIS. A preliminary schedule for implementation is shown in Figure 3.

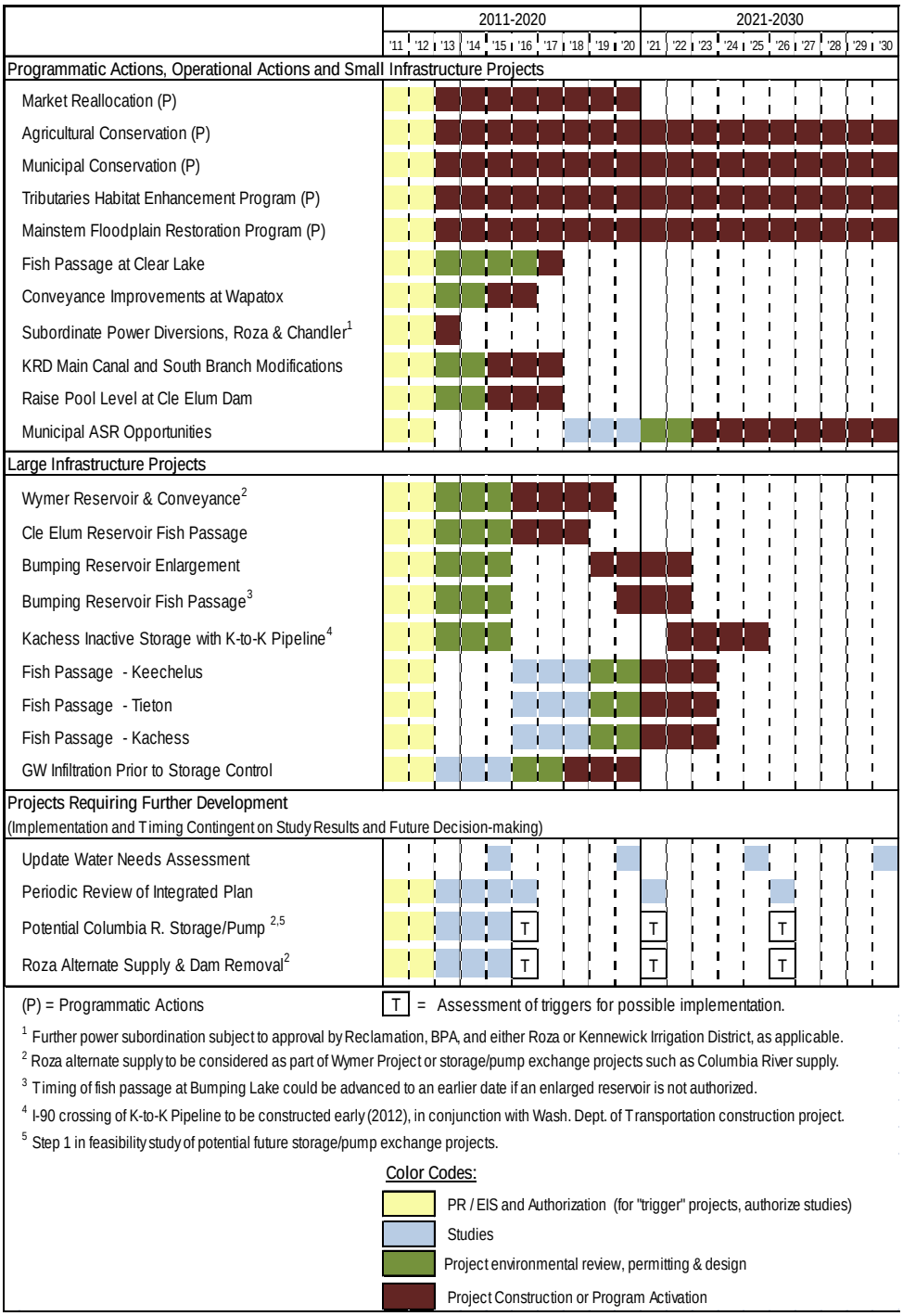

Figure 3. Preliminary Integrated Plan implementation schedule as part of the programmatic EIS (Reclamation and Ecology, 2011a)..

Elements of the Action Alternative

1. Reservoir Fish Passage Element

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 do not currently have fish passage and include Cle Elum, Keechelus, Kachess, Bumping, and Rimrock; Clear Lake Dam does not adequately pass all life stages of bull trout. Fish passage improvements on tributaries that are restricted by flow barriers are included as part of the habitat component of the Integrated Plan.

Construction and operation of fish passage would be constrained by the following:

- Fish passage facilities would be designed and operated within existing operational considerations and constraints outlined in the Interim Comprehensive Basin Operating Plan (Reclamation, 2002), or subsequent Operation Plans (Reclamation, 2008b);
- Operations would continue to serve existing Reclamation contracts and;
- Potential operational changes would be considered that might enhance passage without adversely impacting existing contracts or irrigation water supply.

Table 1. Fish passage locations at each of the five Yakima River Basin dams.

Dam	**Stream Length to Natural or Man-Made Barrier (in River Miles)**
Keechelus	13.8
Kachess	2.4
Cle Elum	29.4
Bumping Lake	~5.2 (with enlargement)
Tieton	36.8
Total	**87.6**

Table 2. Fish passage descriptions and locations, Yakima River basin (figure 4; 5).

Facility	Fish Passage Element
Cle Elum Dam (Figure 6)	Fish passage will be constructed per Augusts 26, 2011 Record of Decision[3]. The downstream fish passage facility will allow fish produced or released into the Cle Elum basin to pass the dam. Passage will facilitate resident fish such as bull trout movement throughout the basin (Reclamation and Ecology, 2011b).
Bumping Lake	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 (BPA, 1990; Reclamation, 2005a). However, in below average water years, there are two areas of Deep Creek that would 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.
Tieton Dam	Tieton Dam currently 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). Fish passage at Tieton Dam and the upstream Clear Lake Dam would make available reservoir habitat in addition to approximately 36.8 miles of spawning and rearing habitat. (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, 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.
Keechelus Dam	The dam currently provides no fish passage facilities. Fish passage would make available reservoir habitat in addition to approximately 13.8 miles of tributary stream habitat, including approximately 7 miles of stream habitat in Gold Creek (Reclamation, 2005a).
Kachess Dam	Fish passage was blocked by construction of Kachess Dam in 1912, and possibly as far back as 1904. Currently, there are no anadromous salmonids upstream of Kachess Dam, only resident fish species, including resident bull trout, kokanee, and resident rainbow trout. Fish passage would make available reservoir habitat as well as approximately 2.4 miles of tributary stream habitat 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).
Clear Lake Dam	Proposed fish passage facilities for Clear Lake Dam consist of a new pool/weir fish ladder located on the left abutment of the dam (Reclamation 2005a, 2005b). The pool/weir fish ladder would provide both upstream and downstream fish passage across Clear Lake Dam. Fish passage operations would occur between June 15 and October 15. Target fish for the ladder design are bull trout with size ranging from about 8 to 47 inches long.

[3] Record of Decision Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project, August, 2011

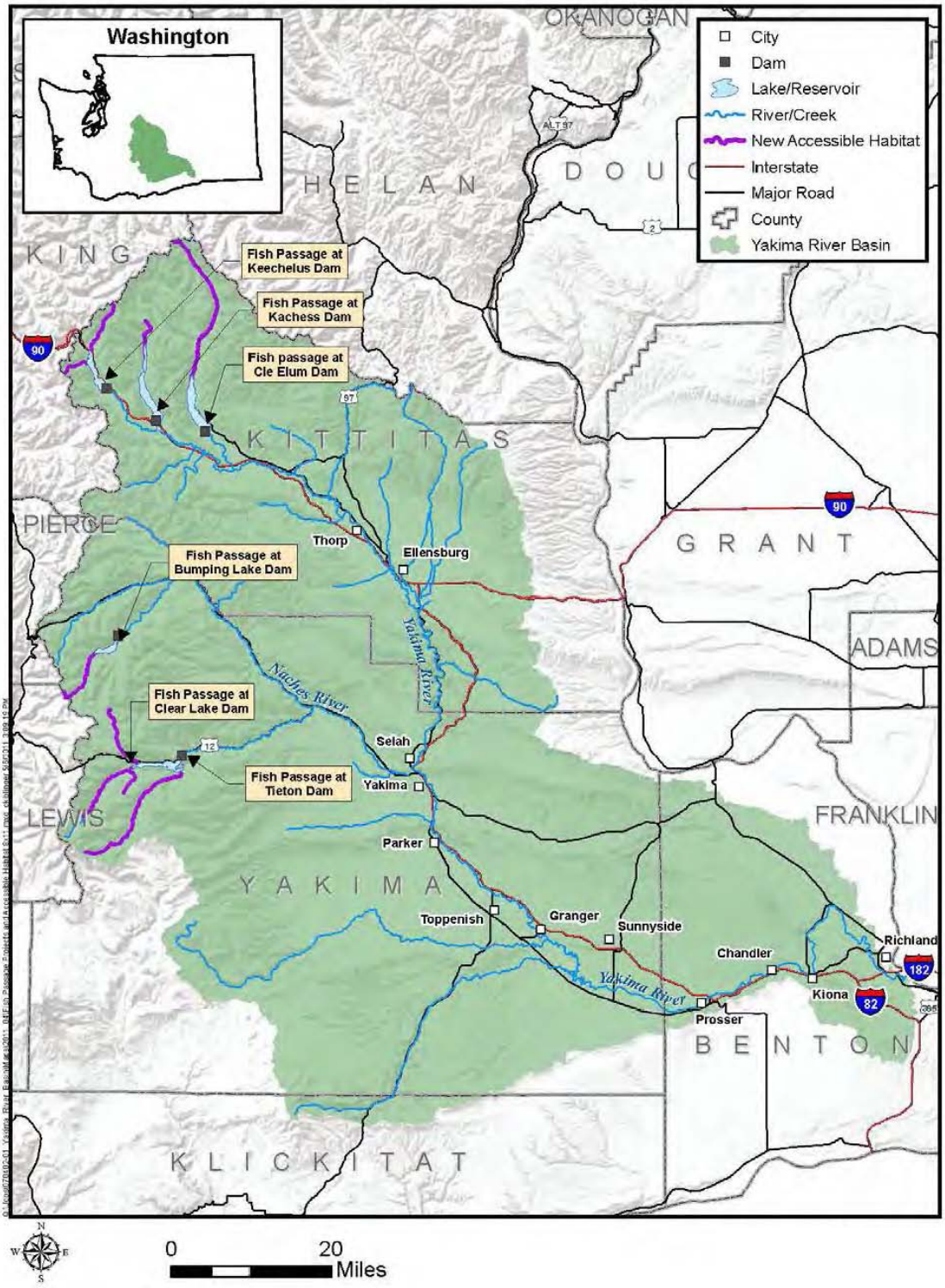

Figure 4. Fish passage facilities proposed as an element of the Integrated Plan (Reclamation and Ecology, 2011a).

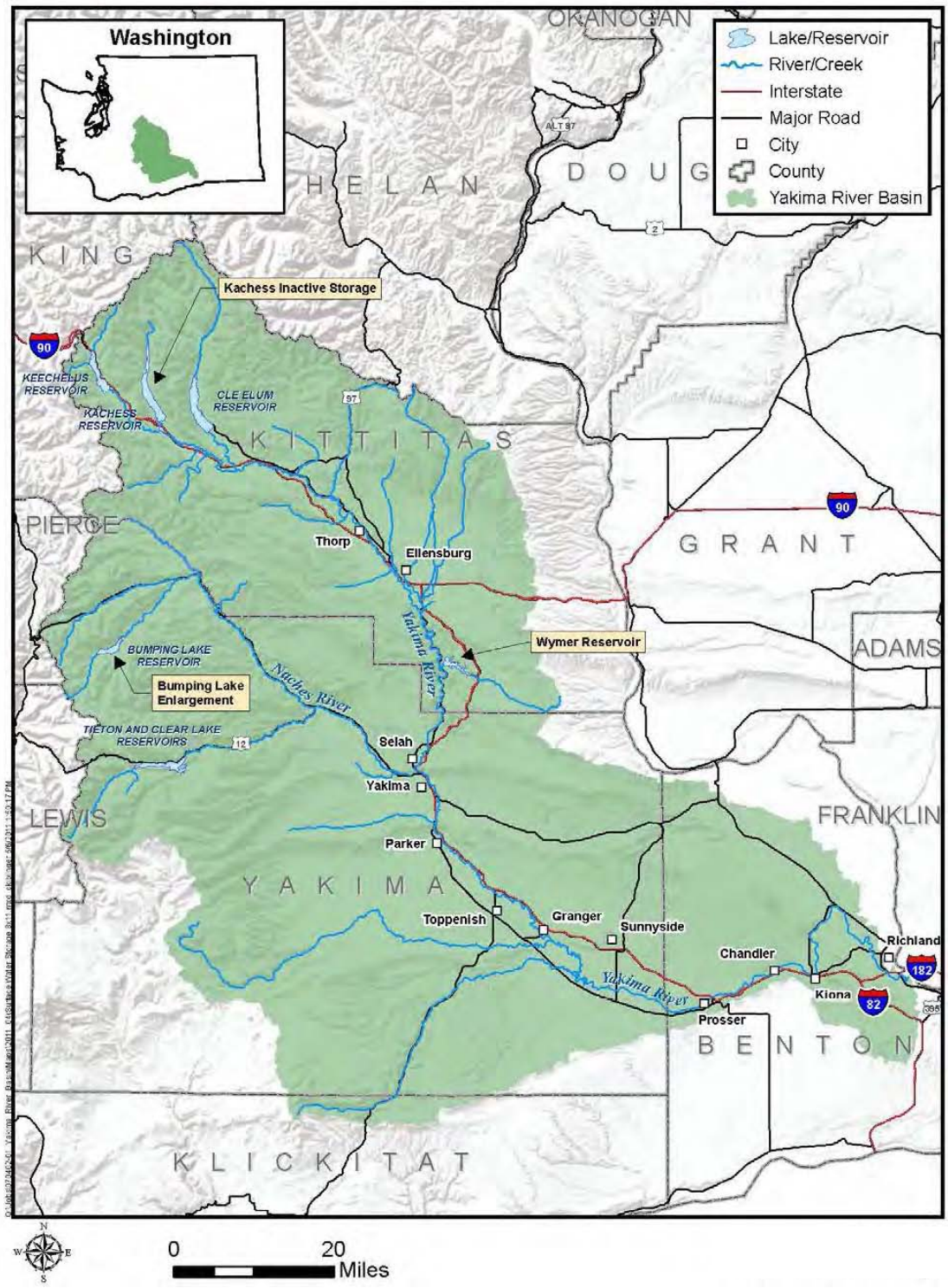

Figure 5. New and existing reservoirs that will be used for project operations (Reclamation and Ecology, 2011a)..

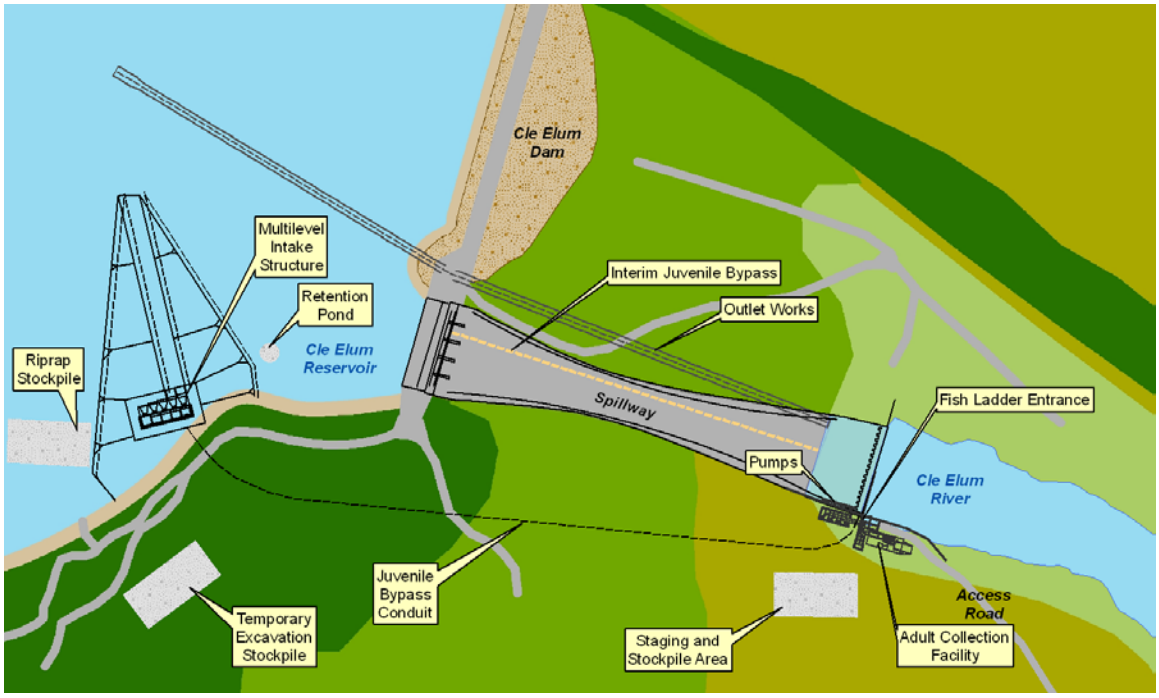

Figure 6. Schematic of Cle Elum Dam providing an example of a typical fish passage facility (Reclamation, 2011)..

2. Structural and Operational Changes 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.

Table 3. Description of structural and operational changes and locations within the basin.

Activity	Structural and Operational Changes Element
Cle Elum Pool Raise	Raising the maximum water level of Cle Elum Lake 3 feet (from 2,240 feet to 2,243 feet above mean sea level) would increase the volume of available storage in Cle Elum Lake by approximately 14,600 acres which would flood additional land around the reservoir for approximately three to ten weeks per year (average of seven weeks). The higher water levels would typically occur between April and August.
Kittitas Reclamation District Canal Modifications	The Kittitas Reclamation District (KRD) diverts water from the Yakima River at Lake Easton at River Mile 202.5, near the town of Easton. The KRD system delivers water for irrigation to approximately 55,500 acres in the Kittitas Valley. Specific actions would include (1) Piping of irrigation laterals along the KRD Main Canal and South Branch Canal, (2) Construction of a re-regulation reservoir to capture KRD operational spills at Manastash Creek and (3) Construction of a pump station on the Yakima River to deliver flows to Manastash Creek water users. Tributary flow improvements would be coordinated with habitat protection and enhancement actions to target improved fish passage at KRD canal crossings. The water saved or transferred would be used to enhance instream flows in tributaries to the Yakima River, including Taneum Creek, Manastash Creek, Big Creek, Little Creek, Tillman Creek, Spex Arth Creek, and others that cross the KRD Main Canal.
Keechelus to Kachess Pipeline	Water would be conveyed from Keechelus Reservoir to Kachess Reservoir to reduce flows and improve habitat conditions during high flow releases below Keechelus Reservoir by providing more water storage in Kachess Reservoir for downstream needs. The pipeline would also help Kachess Reservoir refill after using inactive storage. This project would modify the existing Keechelus Reservoir outlet and the existing outlet tower would be retrofitted with fish screens connected by a pipe to the base of the tower. The total length of the pipeline from the Keechelus Reservoir outlet to the end of the Lake Kachess outfall would be approximately 25,600 feet.
Subordinate Power at Roza Dam and Chandler PowerPlants	Water diversions for power generation would be further subordinated at Roza Dam and Chandler Power plants to support outmigration of steelhead, Chinook, sockeye, and coho juveniles; recognizing that power has already been greatly subordinated for several decades. The Integrated Plan includes a proposal for more power subordination for instream flow benefits for fish. The level of this additional subordination is under discussion.
Wapatox Canal Improvements	Piping and/or replacing the lining along portions of the existing Wapatox Canal would reduce the carriage water diverted into the canal for Wapatox Ditch Company water users. The project includes installing new canal lining from the fish screen midway down the canal and replacing the existing canal downstream from that point with a pipeline, or installing pipe to replace the entire length of the existing canal downstream from the fish screen.

3. Surface Water Storage Element

Additional surface water storage projects would be developed in the Yakima River basin to supply instream flow needs and out-of-stream needs, such as agricultural and municipal and domestic uses. The first three surface water storage projects described below (Wymer Dam and pump station, Kachess Inactive Storage, and Bumping Lake Enlargement) reflect the Workgroup's intent to focus on in-basin solutions to address water supply and aquatic resource problems.

Collectively, these projects represent just over 450,000 acre-feet of additional water supply for instream and out-of-stream uses in the basin. If one or more of the in-basin projects does not receive necessary permits and approvals for implementation, the Workgroup would select a replacement project (or projects) that would supply at least the equivalent quantity of water. With each of these projects, power generation opportunities would also be evaluated.

A portion of any additional supply would be made available for the municipal and domestic needs. This portion of supply should be allocated, in part, to serve needs in each of the three counties of the Yakima Basin. It is proposed that one-half of the municipal and domestic supply be allocated by county-based, projected growth. The other half would remain unallotted and available to municipal and domestic users anywhere in the basin on a first-come, first-served basis after the allotted county portions are allocated.

a) Wymer Dam and Pump Station

A new Wymer Dam would be constructed within the shrub-steppe zone of the mid-Columbia basin to create an off-channel storage facility in the intermittent stream channel of Lmuma Creek, approximately 8 miles upstream of the Roza Diversion Dam and ¾ miles upstream from its confluence within the Yakima River. The storage capacity of the reservoir would be approximately 162,500 acre-feet. Approximately half of the storage capacity would be dedicated to improve instream flows upstream and downstream of the reservoir, while the other half would be used to supplement the irrigation water supply in prorated, water short years.

Water used to improve flows, mainly in the upper Yakima River would be supplied by the release of winter stored water from Keechelus and Cle Elum Reservoirs that would be pumped from the Yakima River into Wymer reservoir near the confluence of Lmuma creek. This operation would increase winter flows in the upper Yakima and Cle Elum rivers and decrease summer flows in the Cle Elum River and upper Yakima River downstream to Lmuma Creek.

Drought relief water for irrigation would be supplied by pumping water during peak fall and winter flow events near Lmuma Creek into Wymer reservoir. This irrigation water would be held in the reservoir until called upon during a prorated water year.

b) Kachess Reservoir Inactive Storage

The Kachess Reservoir is located just east of Interstate 90 near Easton, Washington. The project would tap into Lake Kachess and allow the lake to be drawn down approximately 80 feet lower than the current outlet. This would provide the ability to withdraw another 200,000 acre-feet of

water from the lake, when needed, for downstream uses during drought conditions. However, refill could take multiple years.

Two options have been identified to withdraw the additional water from Lake Kachess, both starting from a new lake tap outlet in the Lake Kachess Dam about 80 feet below the existing outlet at the southeast end of the lake; additional design by Reclamation will help select the preferred option.

Option 1 would use a gravity-flow tunnel that would discharge into the Yakima River approximately 4.6 miles southeast of the Kachess Dam into the Yakima River; Option 2 would withdraw water from the outlet and use a pump station near the lake shoreline to pump through a pipeline to a discharge to the Kachess River just downstream of the dam.

Under either option, fish passage improvements at Box Canyon Creek would be included to improve access for bull trout across a range of flows.

c) Bumping Lake Enlargement

Bumping Lake Dam is located within Wenatchee National Forest in Yakima County, Washington, 40 miles northwest of Yakima on the Bumping River, a tributary to the Naches River with a capacity of 33.700 acre-feet at elevation 3.425 feet.

Two options were evaluated for enlarging the dam. Option A. involves construction of a new dam about 4,500 feet downstream from the existing Bumping Lake Dam with an enlarged capacity of 190,000 acre-feet (Figure 7). The second option, Option B, involves enlarging the reservoir to about 160,000 acre-feet with a new dam immediately downstream and adjacent to the current dam location. Both options would increase the maximum pool elevation to 3,490 feet. Details for both options are still being contemplated by Reclamation.

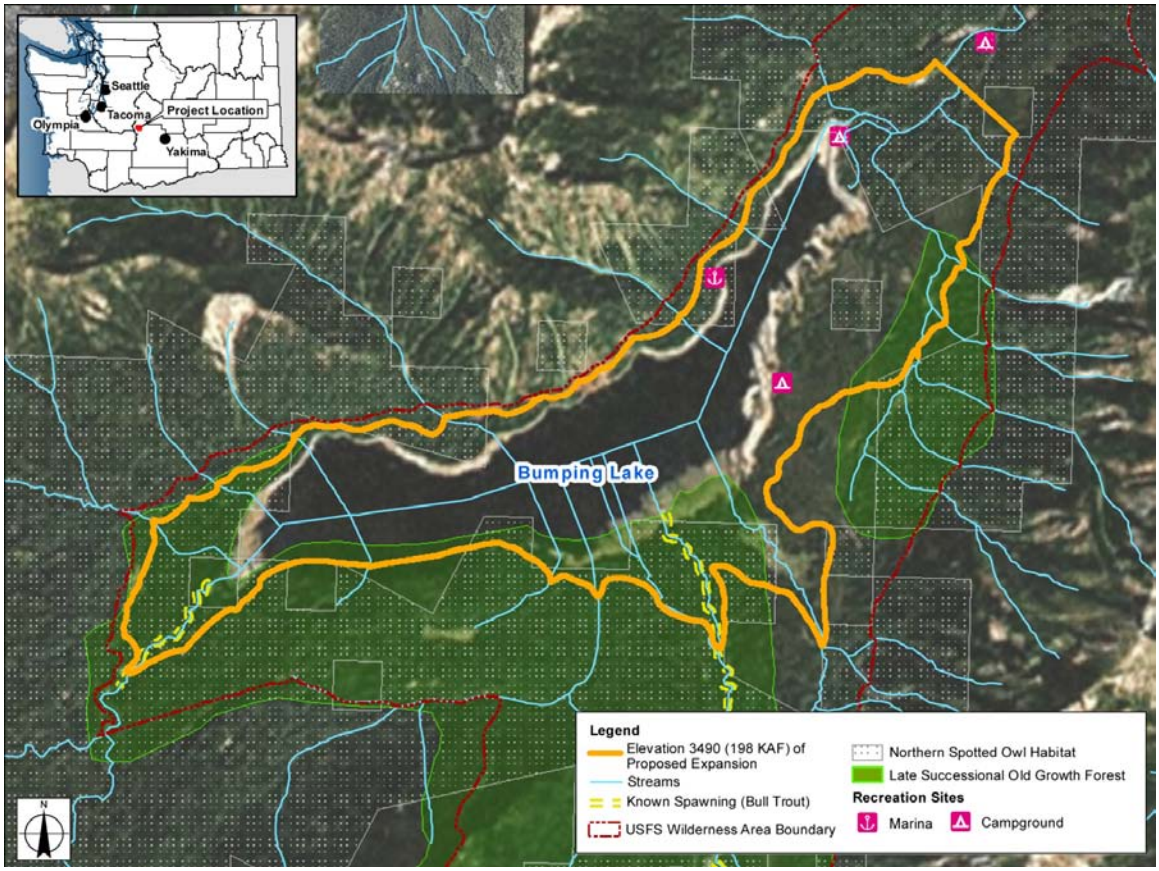

Figure 4. Schematic illustrating the Bumping Lake eenlargement needed to accommodate additional storage (Reclamation and Ecology, 2011a)..

4. Groundwater Storage Element

The Groundwater 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 groundwater discharge, and/or replenish depleted groundwater storage. The source water is expected to be surface water from the Yakima River or one of its tributaries. The availability of water would be a function of seasonal timing and location within the Yakima River basin.

Two proposed groundwater storage actions would use surface water to recharge aquifers and store water for later withdrawal and are listed below.

a) Shallow Aquifer Recharge

The first groundwater storage action involves groundwater infiltration. This would be accomplished by diverting water into designed infiltration systems (ponds, canals, or spreading areas) prior to storage releases from Yakima Project reservoirs in early spring. The timing and scale of surface water diversions would be designed to allow continuation of natural high-flow

events that provide biologic and channel configuration benefits. The project would also try to design infiltration so that return flows arrive in the river at the time they are needed to improve instream flow and reduce water temperature in the summer for the lower Yakima River.

b) Aquifer Storage and Recovery

The second groundwater storage action involves a municipal aquifer storage and recovery system. The City of Yakima would divert approximately 5,000 to 10,000 acre-feet of water from the Naches River during the winter months and treat it at the City's existing water treatment plant. It would then be injected through wells and later pumped out for use by the City's residents and businesses during summer months when demand for water is highest. Aquifer storage and recovery could also be viable for other cities in the Yakima Basin. These projects would require a water treatment facility, one or more wells that could hold treated water, and a pump station for retrieving stored water.

5. Habitat Protection and Enhancement Element

Fish and terrestrial wildlife would benefit from habitat protection such as land acquisition, reconnection of floodplains, re-established side channels, and restoring river and riparian conditions. This element includes proposals for habitat protection in the basin watersheds and habitat enhancements on both mainstem rivers and tributaries in the Yakima River basin. Many of the proposed habitat enhancements have been identified in studies such as the Yakima Subbasin Plan (YBFWRB, 2004) and the Yakima Steelhead Recovery Plan (YBFWRB, 2009). The Integrated Plan would provide funding to complete the actions identified in those plans. The habitat enhancements would provide greater benefits when integrated with the flow and fish passage improvements described in the previous sections.

This element relies heavily on acquiring lands from willing sellers to protect ecological, recreational and extractive resource uses and to provide structure for improved land management. Conservation groups working in parallel with the YRBWEP Workgroup identified and targeted three key areas in the Yakima and Naches River watersheds for land acquisition actions that would help achieve the watershed, water supply, and ecological restoration goals of the Integrated Plan.

A Watershed Lands Conservation Subcommittee was established to advise the YRBWEP Workgroup on options for carrying out a Targeted Watershed Protection and Enhancement program. Actions identified by the subcommittee to meet the Habitat Protection and Enhancement Element of the Plan include the following:

a) Targeted Watershed Protections and Enhancements

The watershed, water supply and ecological restoration goals of the Integrated Plan would be furthered through the protection and restoration of key landscapes. The primary lands that enhance other components of the Integrated Plan are large tracts of land in the Yakima and Naches watersheds that provide high potential to protect and enhance ecosystem health, species conservation and watershed protection.

The targets for watershed protections and enhancements include:

- 45,000 acres as a Conservation Target for High Elevation Watershed Enhancement
- 15,000 acres as a Conservation Target for Shrub-Steppe Habitat Enhancement

- 10,000 as a Conservation Target for Forest Habitat Enhancement.

b) Recommendations for Wilderness Area and Wild and Scenic River Designations
Additional lands are eligible and/ or have already been recommended for federal Wilderness Area and Wild and Scenic River designation through other processes. New designations on existing Forest Service lands could improve watershed and habitat protection while retaining access for recreational uses. Designations could include national recreation, conservation, or wilderness areas or some combination of these.

c) Mainstem Floodplain and Tributary Fish Habitat Enhancement Program
An extensive fish habitat enhancement program will be developed to address mainstem floodplain and tributary habitat restoration priorities through habitat enhancement, flow restoration, fish barrier removal, and screening diversions. These actions would significantly improve prospects for recovering fish populations to levels that are resilient to catastrophic events and the potential impacts of climate change. They would accelerate ongoing efforts to protect existing high value habitats, improve fish passage, enhance flows, improve habitat complexity and functions, and reconnect side channels and off-channel habitat to stream channels.

6. Enhanced Water Conservation Element
The Enhanced Water Conservation Element is an aggressive program of water conservation measures that would improve basin water supply and instream flows. The element includes conservation measures for irrigation district infrastructure improvements, on-farm conservation and irrigation efficiency improvements, municipal and domestic conservation, and commercial and industrial conservation activities. This element includes both agricultural projects and a municipal and domestic conservation program. The scope of the element is not a duplication of the conservation activities to be funded under YRBWEP Phase 2.

a) Agricultural Conservation
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.

An agricultural water conservation program could conserve up to 170,000 acre-feet of water in above average water years, based upon a compiled list of potential projects that could be implemented as a result of this proposed plan.

b) Allocation of Conserved 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 the current YRBWEP allocation, two-thirds of the implementation cost of conservation measures is federally funded by

Reclamation, and one-third is funded equally by a non-federal entity (Ecology) and the implementing entity.

For the Enhanced Water Conservation Element, it is proposed hat at least two-thirds of the implementation cost would be funded by Ecology without federal funds, with the remainder funded by the implementing entity. It is proposed 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 would depend on the funding source and would be determined during the implementation phase.

c) 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. 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.

d) Municipal and Domestic Conservation Program

This program would promote efficient use of municipal and domestic water throughout the Yakima basin using voluntary, incentive-based actions that focus on landscape irrigation, and other consumptive uses. A multi-stakeholder advisory committee on municipal and domestic water conservation (including local and environmental stakeholders) would be convened to organize outreach to local elected officials and provide liaison with Reclamation, Ecology, and the Washington State Department of Health.

7. Market Reallocation Element

Water resources would be reallocated through a “water market” and/or “water bank,” where water rights would be bought, sold, or leased on a temporary or permanent basis, to improve water supply and instream flow conditions in the Yakima Basin.

VIII. EVALUATION METHODOLOGY

Several sources of information were used to analyze resource impacts in the Affected Area, particularly the list of resources provided in the History and Existing Fish and Wildlife Resource sections of this document. The following information sources were utilized to evaluate potential impacts to aquatic and terrestrial resources within the Affected Area; however, most draft documents:

- *December 1999*: Draft Biological Assessment for the Yakima Project Operation and Maintenance;
- *August 2000*: Final Biological Assessment for Yakima Field Office Operation and Maintenance;
- *May 2002*: Draft Interim Operating Procedure; informal consultation meetings between personnel from the Service, NOAA Fisheries (formerly National Marine Fisheries Service), and Reclamation; telephone conversations between the Service, NOAA Fisheries, Reclamation, and others and;
- *March 2001-present*: On-going communications between the Service and Reclamation regarding the Yakima Interim Operation Plan.
- *October 2007*: Final Fish and Wildlife Coordination Act. Prepared for the Bureau of Reclamation.

Additional information comes from past consultation of Federal actions involving habitat disturbance activities in the Middle Columbia River Basin, other relevant projects, and section 10 take permits. Benefits identified by the modeling and the workgroup that are reasonably expected to occur were also used to calibrate the impact analysis. Documents produced as a result of evaluating the Yakima River Basin Water Storage and Feasibility Study, including the Final 2007 CAR, were used to analyze potential impacts associated with the Integrated Plan and includes:

- Existing HEP Analyses
- Existing Aquatic Modeling
- Basin-wide Summary Matrix of Benefits and Impacts
- Fisheries Resource Matrix
- Bull Trout Matrix

In order to (1) determine the impacts resulting from the implementation of the Action Alternative (Integrated Plan), and (2) separate the impacts of the No Action Alternative and the Action Alternative from each other, the Service choose to ignore the future effects of climate change beyond the basic understanding that there will likely be less snowpack due to increased

temperatures. While these basic future impacts are reasonably predictable, a measure of uncertainty does exist as to the magnitude they will assume. For the purpose of our analysis, we assume that equal levels of future impact will occur equally under the No Action Alternative and the Action Alternative.

In addition, the Strategic Habitat Conservation (SHC) framework was relied on throughout much of this document in lieu of detailed information that will be better understood at the project level stage. SHC is defined as an iterative process of developing and refining a conservation strategy, making efficient management decisions, and using research and monitoring to assess accomplishments and inform future iterations of the conservation strategy. SHC is simply a specific form of adaptive resource management wherein habitat management is the primary form of intervention. The goal of SHC is to make natural resource management agencies more efficient and transparent, and, in part, thereby making them more credible and wide-reaching in effect. More details are available in Appendix D of this document.

IX. FISH AND WILDLIFE RESOURCES WITH THE PROPOSED ACTION

Summary

This section has been set up to evaluate impacts associated with implementing elements of the Integrated Plan at the Programmatic Level. Numeric criteria were established to assign an impact level to each element of the project per species and habitat type. Criteria established and illustrated in each of the matrices (Appendix C) is as follows:

Table 4. Numerical ratings used to identify potential benefits and impacts to fish, wildlife, and habitat resources within the project area.

Elevated Benefit	Benefit	Neutral	Impact	Elevated Impact
2	1	0	-1	-2

Threatened and Endangered Species

The matrix used to analyze potential impacts to threaten and endangered species within the project area have been organized in tables by each of the seven elements and their larger project actions (Appendix C). Methods to evaluate impacts are specific to each of the seven elements and include the following:

- Potential effects of project actions on threatened and endangered species in the Affected Area
- Potential effects of project actions on bull trout and bull trout critical habitat within the Affected Area.
- Potential effects of project actions on steelhead critical habitat within the Affected Area.

Endangered Species

Gray Wolf

The proposed action has the potential to affect the gray wolf residing or traveling within the K to K Pipeline project footprint. Further analysis will be required at the project-level EIS stage to avoid adverse effects.

Threatened Species

Bull trout

Enlargement of Bumping Lake Reservoir would impact spawning areas for bull trout in Deep Creek and would inundate an additional 0.8 RM of the Bumping River downstream of the existing dam; prime bull trout spawning and rearing habitat. The enlarged reservoir would inundate up to 3,200 acres of land, of which 1,300 acres are within the existing reservoir footprint.

Passage barriers within the Yakima Core Area have fragmented the bull trout metapopulation and limited migration to high quality spawning, foraging, and overwintering habitat. Of the 12-16 identified local populations, most are either completely or partially isolated (Small, *et al*., 2009). Across the core area, low numbers of migratory bull trout accompanied by lack of passage, limits the potential for genetic exchange and the reestablishment of local populations if local extirpation occurs. Fragmentation of the metapopulation is among the most potent threats to the persistence of the Yakima core area.

The Yakima Core Area populations persist at low numbers, in fragmented, local populations. Redd counts for the past ten years (2001-2010) have varied from 457-795, averaging 572 (WDFW, 2011b). The overall trend in redd counts in the Yakima Core Area is unstable and decreasing because of the lack of interconnectivity, it is currently considered to be at intermediate risk from the deleterious effects of genetic drift. Given the lack of consistent population-census information, the low numbers of spawning migratory bull trout in most of the local populations, the continued lack of connectivity, and decreased numbers of redds in one of the largest populations of bull trout in the Yakima Core Area are considered to have low resiliency and to be at increased risk of extirpation from stochastic events.

The proposed action will have both benefits and adverse effects to bull trout and bull trout Critical Habitat within the Yakima Basin. The enlargement of Bumping Lake will have permanent, adverse effects to bull trout and bull trout Critical habitat by flooding spawning and rearing areas and reducing access to suitable, over-wintering and foraging habitat. However, basin-wide efforts to improve condition for bull trout; particularly reconnecting access to habitats through fish passage and restoration are anticipated to have a net benefit for bull trout over time. A matrix of pathway and indicators were used to evaluate the effects of the proposed action on bull trout (Appendix D).

Canada Lynx

The proposed action has the potential to affect the Canada Lynx in areas within the K to K Pipeline project by interrupting dispersal routes replaced by infrastructure. Further analysis will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects.

Steelhead Critical Habitat

The proposed action has the potential occurs within Steelhead critical habitat. Further analysis will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects.

Grizzly Bear

The proposed action has the potential to affect the Grizzly Bear in areas in areas within the K to K Pipeline project by interrupting dispersal routes replaced by infrastructure. Further analysis

will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects.

Marbled Murrelet
The proposed action has the potential to affect the marbled murrelet in areas where nesting habitat will be replaced by infrastructure; particularly the K to K pipeline project. Further analysis will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects.

Northern Spotted Owl
The enlargement of Bumping Lake and the construction of Wymer Reservoir will adversely affect the Northern Spotted Owl and their habitat. Enlarging the dam at the proposed downstream location would inundate 982 acres of spotted owl and 719 acres of late successional forest habitat, respectively. The proposed action has the potential may, adversely affect the northern spotted owl and their habitat in areas where habitat will be replaced by infrastructure, particularly the K to K pipeline. Further analysis will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects. Lands targeted for acquisition in the Teanaway Forest ridge have the potential to improve suitable habitat for northern spotted owls in the long-term.

Candidate Species

Greater Sage-grouse
The construction of Wymer Reservoir and reconnecting floodplain habitats that have become shrub-steppe over time will adversely affect sage-grouse habitat, including movement corridors and habitat for the greater sage-grouse would be affected directly by Wymer Reservoir. According to Reclamation (2008), Wymer Reservoir would inundate up to 1,055 acres of shrub-steppe habitat. A movement corridor runs north to south through the Yakima River Canyon. The proposed reservoir lies east of the canyon. Sage-grouse moving west from the Yakima Training Center to the canyon would be required to migrate to the north or south of the reservoir (Reclamation, 2008a). The reservoir would cause loss of movement corridors and would further isolate and fragment greater sage-grouse populations and substantially decrease and/or eliminate suitable habitat; shrub-steppe is a priority habitat for the Service and WDFW.

Lands targeted for acquisition under the Habitat Protection and Enhancement Element of the Integrated Plan may provide relief and additional protection for sage-grouse within the Yakima Basin, however, further analysis will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects.

Oregon Spotted Frog
The proposed project may decrease some existing wetlands within the Yakima River basin. As such, this will mean an adverse impact in the form of habitat loss**.** Further analysis will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects.

Wolverine
The proposed action has the potential to slightly, adversely affect the Wolverine movement corridors if replaced with infrastructure. Further analysis will be required at the project-level EIS stage to identify mitigation that could avoid adverse effects.

Ute ladies'-tresses, Umtanum Desert Buckwheat, Basalt Daisy, Mardon Skipper, and Northern Wormwood[4]
The proposed action is not likely to adversely affect the Ute ladies-tresses, the Umtanum desert buckwheat, the basalt daisy, the Mardon skipper, or the northern woodworm. Restoring floodplains may increase habitat opportunities for Ute ladies-tresses in the future.

Fisheries Resources
The matrix used to analyze impacts to threatened and endangered species potentially in the project area by each of the seven elements and their larger project actions is located in Appendix D. Methods to evaluate impacts are specific to each of the seven elements and include potential effects of project actions on fishery resources within the affected area by river reach. Actions that will occur under the Habitat Protection and Enhancement Element of the Integrated Plan are expected to improve the population abundance, productivity, and life history diversity for anadromous and resident fishes through the Yakima River basin, including tributaries.

Full implementation of the Integrated Plan are anticipated to improve stream flows for rearing and/or spawning conditions for resident fishes affected by Project operations. Table 6 compares the instream flow of the Integrated Plan relative to FWIP. Results indicate that 13 of 15 mainstem reaches and certain Yakima River tributaries could benefit from improved flows due to the increased supply and operational flexibility available under the Integrated Plan.

[4] These plant species were not included in the table because these species are not currently known to exist in the project area.

Table 5. Changes to stream flow as a result of full implementation of the Integrated Plan (2009)

Changes to Stream Flow	Proposed Action
Yakima River from Keechelus Dam to Lake Easton	++
Yakima River – Easton Reach	++
Cle Elum River	++
Yakima River from Cle Elum to Teanaway River	++
Yakima River from Teanaway River to Roza Dam	++
Yakima River from Roza Dam to Naches River	+
Yakima River from Parker Gage to Toppenish Creek	+
Yakima River from Toppenish Creek to Prosser Dam	+
Yakima River – Chandler Reach	+
Yakima River from Chandler Power Plant to Columbia River	+
Bumping River from Bumping Dam to Naches River	+
Tieton River	++
Lower Naches River	-
Manastash, Taneum, Big, Littler, and other Tributaries	+
North Side Kittitas Valley Tributaries	+
Other Tributaries – including Cowiche and Ahtanum	0
New water available for pulse flows or other flow improvements	+

-- Irrevocable Negative Impact
- Negative Impact
0 Neutral
+ Some Benefit
++ Significant Benefit

Anadromous Fish

The proposed action is not likely to adversely affect anadromous fish within the project area; anadromous fish are expected to benefit by project implementation; particularly from fish passage and habitat protection (steelhead critical habitat was analyzed in the Threatened and Endangered Species section of this document). Fish passage will facilitate anadromous fish movement and it is expected that fish passage will significantly improve the ecological

conditions above and below the dams (e.g. reintroducing sockeye, a potential prey species for bull trout). Further analysis will be required at the project-level EIS stage.

Resident Fish

The proposed action is not likely to adversely affect unlisted resident fish within the project area. The same rationale used for anadromous fish effects were used for resident fish (bull trout are analyzed in the Threatened and Endangered Species section of this document). Further analysis will be required at the project-level EIS stage.

Terrestrial Resources

Actions that will occur under the Habitat Protection and Enhancement Element of the Integrated Plan are expected to expand habitat for wildlife and protect watersheds within the Yakima River Basin; most notably lands within the Teanaway forest and several large shrub-steppe parcels within the lower Yakima River are being contemplated.

The Service assumed that impacts identified for threatened and endangered wildlife species would be similar, respectively, for other wildlife; therefore the Service did not evaluate impacts beyond those listed in Table 8, Appendix C. Methods to evaluate impacts are specific to each of the seven elements and include evaluating the potential effects of project actions on habitat types within the affected area by each of the seven project elements.

Wildlife

Impacts to wildlife vary. Placement of infrastructure, construction windows, and noise can all disrupt vital behaviors such as reproduction, or interrupt and displace wildlife using migration routes, avoidance (which may result in loss of prey base, increased completion and increased predation), and direct mortality. As individual site specific projects are proposed, the Service can better assess impacts to reduce, avoid, or compensate impacts to wildlife; further analysis will be required at the project-level EIS stage.

Riparian and Wetland Resources

It is anticipated that palustrine (unclassified) wetlands and other riparian habitats would be permanently lost as habitat as result of the project (USFWS, 2007). It is anticipated that seepage from Wymer reservoir may provide subsurface and possible surface flows that likely would expand the riparian and wetland plant community in Lmuma Creek downstream from the dam, which could result in the loss of shrub-steppe habitat. If Wymer Reservoir is constructed, it is unlikely viable lakeshore fringe will be created due to water level fluctuations.

Shrub-Steppe and Grassland Habitat

Shrub-steppe habitat in eastern Washington has been altered significantly over the past century from land conversions. It is anticipated that there will be adverse, significant impacts to shrub-steppe habitat within the project area; particularly in the Wymer Reservoir footprint. Further analysis will be required at the project-level EIS stage to identify replacement lands and mitigation ratios yet to be determined.

Three large areas of shrub-steppe remain in the Yakima River basin; two are on Federal lands (the Yakima Training Center and the Hanford Reach National Monument) and the third is on the Yakama Nation Indian Reservation. Management efforts underway at these three remaining sites to preserve, restore, and increase shrub-steppe habitat and connectivity. The South-Central Washington Shrub Steppe/Rangeland Conservation Partnership and Washington's Greater Sage-

Grouse Recovery Plan seek to implement these objectives for the remaining tracts of shrub-steppe (Stinson *et al.* 2004). In addition, outside of these larger protected areas, residual shrub-steppe habitat continues to be threatened by urban and residential development and habitat fragmentation.

Forest Lands

It is anticipated that forest lands will be adversely impacted as the result of construction activities and inundation from the Bumping Lake expansion. Further analysis will be required at the project-level EIS stage to identify replacement lands and mitigation ratios yet to be determined.

Agricultural Lands

Farmland is used marginally by wildlife for foraging and for cover. As more water is made available for agriculture and the population of the Yakima Basin grows, there is potential for upland, shrub-steppe habitats to be converted to farmland or residential/commercial development. Displacement of wildlife from their current habitat as a result of land conversion will require further investigation as the project-level EIS stage.

X. FISH AND WILDLIFE RECOMMENDATIONS AND CONSERVATION MEASURES

The Integrated Plan was designed in part to reduce current adverse effects to fish and wildlife resources by "proposing water resource and habitat protection and restoration solutions in the Yakima Basin" (Reclamation and Ecology, 2011a); however, concerns remain for the potential affects to fish and wildlife resources within the Yakima River basin that may not be fully analyzed, mitigated or ameliorated as part of the proposed plan. The major concerns with elements of the Integrated Plan include: (1) impacts to bull trout and their critical habitat, (2) loss of occupied northern spotted owl habitat and designated critical habitat, (3) removal of shrub-steppe lands to build a proposed reservoir, and (4) ensuring current and future habitat connectivity for aquatic species.

The Service's Mitigation Policy (FWS Manual 501 FW 2) was used to provide recommendations in this CAR. In accordance with this policy, the definition of mitigation includes: a) avoiding the impact altogether by not taking a certain action or parts of an action; b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; c) rectifying the impact by repairing, rehabilitating, or restring the affected environment; d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and e) compensating for the impact by replacing or providing substitute resources or environments (40 CFR Part 1508.20(a-e)).

Recommendations to mitigate for potential impacts to fish and wildlife are commensurate with the types of programmatic actions proposed and may be general in nature at this stage of the proposed Integrated Plan. It is anticipated that these recommendations will either become part of the proposed action, and will be evaluated in detail during individual project analysis. The following recommendations and conservation measures are made under Endangered Species Act, Migratory Bird Treaty Act, Bald Eagle Protection Act, and the National Environmental Policy Act

Recommended Alternative

The programmatic DEIS only presented two alternatives, the No Action and the Action Alternative. The No Action Alternative is intended to represent current and potential future activities in the absence of implementing the Integrated Plan. The Integrated Plan is the Action Alternative and is made up of seven, nondiscretionary elements (meaning all elements are to be implemented) that were identified over two years by resource agencies, tribes, irrigators, cities, counties, and other stakeholder groups as essential for future water management and resource protection.

Based on the information provided to the Service and with the understanding that each of the seven elements will need additional project-level environmental compliance to analyze, identify, and evaluate environmental impacts, the Service recommends the Action Alternative. The Service is of the opinion that the Action Alternative has greater probability of improving fish and wildlife resources beyond what currently exist within the Yakima River Basin than the No Action Alternative.

In making this recommendation, the fish and wildlife resource elements were considered to proceed concurrently within the elements of the Action Alternative, as scheduled in the Integrated Plan. The Service recognizes that there will be new impacts to vital shrub-steppe, bull trout spawning habitat, and old growth forests from modification and new reservoir construction, as well as from the construction of conveyance systems. These impacts will be evaluated during the project planning stage for each element.

Typically, the Service responds with comments after a DEIS is issued, therefore the Service retains its authority to modify this CAR in the event that new information or circumstances present themselves, including changes to any of the seven project elements presented in the Final PEIS. In addition, the Service, in coordination with WDFW, strongly recommends that the conservation measures and recommendations within this document be incorporated into the Final Programmatic EIS as project-level actions to reduce anticipated impacts or restore/enhance ecological resources. Incorporating these conservation measures and recommendations will provide a necessary framework for future ESA consultation, if elements of the Integrated Plan move to the project planning phase.

The proposed action was evaluated at the programmatic level and conservation measures and recommendations were formulated in coordination with WDFW. During this evaluation, the Service, in coordination with WDFW, considered elements of the Integrated Plan that were developed to protect, conserve, or enhance opportunities for fish, wildlife, and their habitat (e.g., fish passage and habitat restoration).

The following Service conservation measures and recommendations were developed to avoid or alleviate potential impacts or support environmental enhancements identified as elements of the Integrated Plan. If the sequencing of the proposed actions is subsequently modified, the Service may modify conservation measures and recommendations as appropriate.

Endangered and Threatened Species and Critical Habitat

Endangered Species

1. The proposed action has the potential to affect the gray wolf within the K to K Pipeline project footprint. The Service recommends that Reclamation work with the Service at the project design stage to ensure that wolves, as well as other wildlife, have sufficient means to disperse into areas south of I-90.

2. The Service recommends that Reclamation work with the Service and WDFW at the project design stage to identify and implement strategies to reduce interference with wolf prey species such as elk and deer.

Threatened Species

1. Expansion of the Bumping Lake Reservoir will inundate old growth forest that provides habitat for northern spotted owls. The Service supports implementation of Element 5 – *Habitat Protection and Enhancement* of the Integrated Plan, as a means to acquire lands that may contribute to long term conservation of northern spotted owls. The Service recommends that Reclamation work with the Service to monitor and evaluate northern spotted owl

populations in any newly acquired habitat. The Service will evaluate impacts to northern spotted owls within the Bumping Lake footprint at the project planning stage.

a. Efforts should be made to evaluate current barred owl populations in areas where northern spotted owl habitat is proposed to be restored, enhanced or acquired for protection to determine the likelihood of northern spotted owls use of areas and the areas' potential for meeting project wildlife objectives.
b. Efforts should be made to update northern spotted owl population data and to inventory nesting sites within the Yakima River basin.

2. It is unknown at this time if and how marbled murrelets and their habitat will be impacted as result of implementing the Integrated Plan. The Service will evaluate impacts to marbled murrelets and their habitat at the project planning stage.

3. Continue efforts to protect steelhead critical habitat within the basin and implement actions designed to reconnect habitat to promote gene flow (i.e. provide fish passage), restore ecological processes, and restore access. The Service supports the fish passage projects identified for steelhead in the Integrated Plan and recommends that Reclamation continue to coordinate with the Service on the fish passage implementation schedule.

4. The Service recommends Reclamation coordinate with NOAA and the Yakima Basin Fish and Wildlife Recovery Board to assure habitat restoration projects are implemented as recommended in the Yakima Steelhead Recovery Plan (NMFS 2009). The Service supports implementation of Element 5 of the Integrated Plan – *Habitat Protection and Enhancement* as a means to create improved spawning, incubation, rearing, and migration conditions for steelhead.

5. Implement the following bull trout conservation measures and recommendations which expand on and are in addition to activities identified in Element 1 – *Fish Passage* and Element 5 – *Habitat Protection and Enhancement*:

a) Improve habitat connectivity for all life stages of bull trout in the Yakima River Basin. Evaluate and modify dams, including diversion structures and their associated fishways, through structural and operational changes, as needed. Reconnecting habitat to promote gene flow, support ecological processes, and provide access to and from spawning habitat for bull trout is vital to the recovery of bull trout in the Yakima Basin. Passage is a Primary Constituent Element (PCE) of bull trout critical habitat that will need to be fully addressed in project level planning. The Service supports the fish passage projects identified in the Integrated Plan and recommends that Reclamation continue to coordinate with the Service on the fish passage implementation schedule and on project elements that could provide improved passage for all life stages of bull trout in the basin.

b) The Service recommends implementing Element 6 of the Integrated Plan - *Enhanced Water Conservation* as soon as possible to increase water availability in the basin, which may result in improved habitat conditions for the bull trout. Water quantity and quality are PCEs of bull trout critical habitat, and these habitat conditions may improve with increased water availability.

c) Continue to coordinate with the Bull Trout Recovery Team and the Bull Trout Action Team to develop a schedule to sequence activities described in the Integrated Plan to alleviate impacts to and enhance restoration opportunities for bull trout populations. This sequencing will assist in implementation of the final *Yakima Basin Bull Trout Action Plan* and the Service's 2002 *Draft Bull Trout Recovery Plan*. Storage projects will impact bull trout populations and its critical habitat, in particular above Bumping and Kachess Dams. The sequencing of activities identified in the Integrated Plan is necessary for ESA compliance of some project elements.

d) Coordinate with the Bull Trout Recovery Team and the Bull Trout Action Team to implement restoration projects to protect and improve habitat for bull trout and its critical habitat. Acceleration of improvements to habitat and connectivity for bull trout at all life stages will be needed for the species to withstand future negative impacts from Integrated Plan elements planned for the future. Implementing activities which improve habitat and reduce direct impacts to bull trout as soon as possible has the potential to reduce current declines of bull trout in the basin and will assist in future project ESA compliance.

e) Continue to coordinate with the Bull Trout Recovery Team and the Bull Trout Action Team to protect spawning and rearing habitat in headwater area and foraging, migration, and overwintering habitats within watersheds as identified in the on-going bull trout recovery planning process.

f) Evaluate the feasibility of using supplementation to restore declining bull trout populations within the Yakima River basin historically known to bear bull trout.

g) The presence of nonnative fishes (e.g., lake trout) may have contributed significantly to the decline of the Cle Elum Lake bull trout local population. The Service recommends assessing the feasibility of non-native fish removal to advance bull trout recovery efforts.

h) Conduct a study to investigate the feasibility of improving bull trout habitat and access to habitat in Gold Creek. Gold Creek, a tributary of Keechelus Lake, becomes dewatered during late summer/fall. As a result, bull trout are prevented from moving between Keechelus Lake and Gold Creek to spawn. Assessing the feasibility of restoring habitat connectivity to Gold Creek/Keechelus Lake is a necessary step in recovering bull trout. The Service recommends coordinating with the Bull Trout Recovery Team and the Bull Trout Action Team to study, develop, implement, and monitor a long-term solution to this habitat connectivity issue.

i) Improve water quality for bull trout by evaluating the feasibility of releasing cooler water from dams to temper stream and rivers segments that exceed temperatures required by bull trout to rear and spawn and implementing water releases to address this issue (i.e., many reaches in the Yakima Basin are 303(d) impaired waters due to elevated temperatures). Water quality may also be improved by implementing actions that result in a more "naturalized" hydrograph in the Yakima River. The Service recommends that Reclamation continue to investigate the feasibility of

moderating the peak and base flows through project operations to mimic the natural hydrograph to the maximum extent practicable, in order to support the recovery of bull trout.

Candidate Species

1. Protect shrub-steppe habitat through implementation of Element 5 – *Habitat Protection and Enhancement* of the Integrated Plan. The proposed Wymer Reservoir will be located within existing sage-grouse habitat that is likely occupied for at least portions of the year and could provide habitat for future sage-grouse populations. Land protection proposed as part of the Integrated Plan will mitigate for shrub-steppe habitat loss due to the proposed construction of Wymer Reservoir at a ratio of approximately 3:1.

2. Restore, enhance and protect shrub-steppe habitat from wildfire within the Yakima Basin, particularly shrub-steppe habitat acquired for long term conservation. Much of the existing shrub-steppe habitat in the basin needs understory vegetation restoration and enhancement, barrier removal and other sage-grouse threats addressed to some degree. The Service recommends that wildfire protection plans be developed and implemented for large shrub-steppe areas on lands acquired under Element 5 of the Integrated Plan – *Habitat Protection and Enhancement* for long-term habitat protection. The Service also recommends that Reclamation explore funding options to develop management plan(s) for shrub-steppe habitat, including a fire protection plan, that is acquired as part of the Integrated Plan and to implement the plan(s), including a fire protection plan.

3. Inventory and monitor sage-grouse in any newly acquired lands to determine the location of areas used by sage-grouse, population size, habitat use, and how sage-grouse using the area might be displaced by proposed construction. The Service will evaluate impacts to sage-grouse within the Wymer footprint at the project planning stage.

Fisheries Resources

1. Improve habitat connectivity by implementing the fish passage projects identified in the Integrated Plan. The Service recommends that Reclamation continue to coordinate with the Service and other fish managers to refine the fish passage implementation schedule illustrated in the Integrated Plan. Reconnecting habitat to promote gene flow, ecological processes, and access to spawning, rearing, and over-wintering habitat for anadromous and resident fish is a high priority for the Service and WDFW.

2. The Service recommends implementing Element 6 of the Integrated Plan - *Enhanced Water Conservation* as soon as possible to increase water availability in the basin, which may result in improved habitat conditions for fisheries resources. Water quantity and quality are important aspects of aquatic habitats, and these habitat conditions may improve with increased water availability.

3. The Service supports early implementation of acquiring headwater lands described in Element 5 of the Integrated Plan – *Habitat Protection and Enhancement* to improve habitat for fish, and protect and improve riparian corridors. Protection of headwater streams is important for the ecological health of watersheds and fisheries resources.

4. Create improved spawning, incubation, rearing, and migration conditions for all salmonid species and resident fish residing in the Yakima Basin. The Service supports early implementation of Element 5– *Habitat Protection and Enhancement* of the Integrated Plan for this purpose. The Service recommends that Reclamation coordinate with the Service, the Yakama Nation, NOAA, WDFW, and the Yakima Basin Fish and Wildlife Recovery Board to implement habitat restoration projects aligned with on-going planning efforts and fish management priorities within the basin.

5. Modify existing irrigation diversions to provide adequate functional screening to prevent fish mortality due to water diversion infrastructure throughout the basin. The Service recommends that Reclamation continue to coordinate with the Service, the Yakama Nation, NOAA, WDFW, and the Yakima Basin Fish and Wildlife Recovery Board to inventory, prioritize, and address irrigation diversions in need of screen installation and/or maintenance activities.

6. Coordinate activities with the Yakima Klickitat Fisheries Project (YKFP) to monitor and evaluate changes to fish populations, assemblages, and habitats at the project planning stage. The YKFP implements and monitors fish supplementation activities with the basin as a means to maintain or increase natural production of salmonids.

Terrestrial Resources

1. Protect shrub-steppe habitat for its use by a unique assemblage of species, such as black tailed jackrabbit and Townsend's ground squirrel. The Service supports early implementation of Element 5– *Habitat Protection and Enhancement* of the Integrated Plan as a means to acquire lands that protects shrub-steppe habitats. The Service will evaluate direct impacts to shrub-steppe habitat from the construction of Wymer Reservoir, as well as other construction projects as they are planned at the project level.

2. Protect large, contiguous wildlife habitats. The Service supports early implementation of Element 5 – *Habitat Protection and Enhancement* of the Integrated Plan to provide refuge for wildlife species anticipated to be displaced by the proposed action. The Service recommends that Reclamation continue to work with the Lands Subcommittee and the Service to identify and acquire lands that provide benefits to wildlife and support our mutual conservation strategies and partnerships.

General Provisions

1. The Service recommends that Reclamation work with the Service to develop Best Management Practices that avoid or reduce impacts to fish, wildlife and their habitats at the project planning stage, as subsequent actions are proposed and fully planned.

2. The Service recommends that Reclamation continue to work with the Service to develop an ESA consultation schedule for current project operations and maintenance activities within the Yakima River Basin prior to consulting on Integrated Plan elements.

3. The Service recommends that Reclamation work with the Service to develop an ESA consultation schedule for Integrated Plan elements likely to move into the project planning stage.

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APPENDIX A

Washington State 303(d) List for the Yakima River Basin

Washington 303(d) List			
WATERBODY SEGMENT #	WATERBODY NAME	PARAMETERS EXCEEDING STANDARDS	BASIS FOR CONSIDERATION OF LISTING
WA 39 1010	YAKIMA RIVER	DDT	Johnson, et al. 1986. = excursions beyond the criterion of edible tissue in Mountain Whitefish, Bridegelip sucker, Norther Squawfish, and Spring Chinook in 1985.
WA 39 1010	YAKIMA RIVER	4,4'-DDE	Johnson, et al. 1986. = excursions beyond the criterion of edible tissue in Mountain Whitefish, Bridegelip sucker, Norther Squawfish, and Spring Chinook in 1985.
WA 39 1010	YAKIMA RIVER	Dieldrin	Johnson, et al. 1986. = excursion beyond the criterion of edible tissue in Spring Chinook on 5/21/85.;1 excursion beyond National Toxics Rule (40 CFR Part 131) criterion at USGS station 12484500 on 7/27/88.
WA-39-1012	WENAS CREEK	Instream Flow	Yakima River Subbasin Plan, 1990;U.S. Bureau of Reclamation, 1990;U.S. Fish and Wildlife, 1990;SASSI, 1993;Nehlson, et al. 1991.;The stream meets all the Water Quality Program Policy criteria for inadequate instream flow and has been added to the list. H
WA-39-1020	WILSON CREEK	Temperature	2 excursions beyond the criterion at USBR station YAV146 on 8/28/90 and 7/25/94.;Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 7 excursions beyond the criterion in 1995.
WA-39-1020	WILSON CREEK	Fecal Coliform	3 excursions beyond the criterion at Ecology ambient monitoring station 39C070 during 1993.;Johnson and Prescott, 1980.
WA-39-1025	NANEUM CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1030	YAKIMA RIVER	DDT	Johnson et al. 1986. = excursion beyond the criterion in edible tissue of the Mountain Whitefish on 8/19/85.
WA-39-1030	YAKIMA RIVER	4,4'-DDE	Johnson et al. 1986. = excursion beyond the criterion in edible tissue of the Mountain Whitefish on 8/19/85.
WA 39 1032	CHERRY CREEK	Temperature	Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 4 excursions beyond the criterion in 1995.
WA 39 1032	CHERRY CREEK	DDT	Rinella, et al. 1992 = 2 excursions beyond the criterion on 8/31/88 and 3/9/89.
WA 39 1032	CHERRY CREEK	4,4'-DDE	6 excursions beyond National Toxics Rule (40 CFR Part 131) criterion at USGS station 12484480 in 1988 and 1989.
WA 39 1032	CHERRY	Dieldrin	Rinella, et al. 1992 = 6 excursions beyond the criterion

	CREEK		between 5/5/88 and 3/9/89.
WA-39-1034	COOKE CREEK	Dissolved Oxygen	Joy, 1993.Joy, 1988.
WA-39-1034	COOKE CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.;Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 2 excursions beyond the criterion in 1993
WA-39-1034	COOKE CREEK	Fecal Coliform	Joy, 1993.Joy, 1988.
WA-39-1037	CRYSTAL CREEK	pH	Joy, 1985.
WA-39-1050	CLE ELUM RIVER	Temperature	26 excursions beyond the criterion sampled by Wenatchee National Forest in 1993.
WA-39-1053	THORP CREEK	Temperature	1 excursion beyond the criterion sampled by Wenatchee National Forest on 7/24/94.;Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 5 excursions beyond the criterion in 1995.
WA-39-1055	COOPER RIVER	Temperature	21 excursions beyond the criterion sampled by Wenatchee National Forest in 1994.
WA-39-1057	WAPTUS RIVER	Temperature	Numerous excursions beyond the criterion sampled by Wenatchee National Forest in 1994.
WA-39-1060	YAKIMA RIVER	Temperature	2 excursions beyond the criterion at Ecology ambient monitoring station 39A090 on 7/13/92 and 8/10/92.
WA-39-1060	YAKIMA RIVER	Dissolved Oxygen	6 excursions beyond the criterion at Ecology ambient monitoring station 39A090 between 1990 and 1992.
WA-39-1070	YAKIMA RIVER	Temperature	30 excursions beyond the criterion sampled by Wenatchee National Forest in 1994.
WA-39-1073	BIG CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1073	BIG CREEK	Instream Flow	U.S. Bureau of Reclamation, 1990.;USGS flow data 0.2 mile downstream of main canal, 0.8 mile upstream of Interstate-90.;Yakima River Subbasin Plan, 1990.;SASSI, 1993;Nehlson, et al. 1991.;The stream meets all the Water Quality Program Policy criteria for
WA-39-1075	CABIN CREEK	Temperature	Numerous excursions beyond the criterion sampled by Wenatchee National Forest between 1989 and 1994.
WA-39-1077	LOG CREEK	Temperature	8 excursions beyond the criterion sampled by Wenatchee National Forest between 1989 and 1990.
WA-39-1110	SELAH DITCH	Ammonia-N	Joy, 1990.
WA-39-1110	SELAH DITCH	Chlorine	Joy, 1990.
WA-39-1110	SELAH DITCH	Dissolved Oxygen	Joy, 1990.
WA-39-1300	GALE CREEK	Temperature	31 excursions beyond the criterion sampled by Wenatchee National Forest in 1994.
WA-39-1350	MEADOW CREEK	Temperature	12 excursions beyond the criterion sampled by Wenatchee National Forest in 1994.
WA-39-1390	GOLD CREEK	Temperature	4 excursions beyond the criterion sampled by Wenatchee National Forest below Old Gold Unit #8 in

			6/94.
WA-39-1400	SWAUK CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1420	SWAUK CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1425	WILLIAMS CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1435	BLUE CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1440	IRON CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1500	TANEUM CREEK	Instream Flow	U.S. Bureau of Reclamation, 1990 = measured flows near the mouth;USGS flow data from gage at the mouth;U.S. Fish and Wildlife, 1990;Yakima River Subbasin Plan, 1990;SASSI, 1993;Nehlson, et al. 1991.;The lower stream segment meets all the Water Quality Pro
WA-39-1520	TANEUM CREEK	Temperature	31 excursions beyond the criterion sampled by Wenatchee National Forest in 1994.
WA-39-1558	LOOKOUT CREEK	Temperature	Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-1570	TANEUM CREEK, S.F.	Temperature	8 excursions beyond the criterion sampled by Wenatchee National Forest in 1994.
WA-39-2000	TEANAWAY RIVER	Instream Flow	U.S. Bureau of Reclamation, 1990 = flows measured near the mouth;U.S. Bureau of Reclamation flow data from gage at RM 11;U.S. Fish and Wildlife, 1990;Yakima River Subbasin Plan, 1990;SASSI, 1993;Nehlson, et al. 1991.;The stream meets all the Water Quality
WA-39-2000	TEANAWAY RIVER	Temperature	Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 41 excursions beyond the criterion in 1994.
WA-39-2100	TEANAWAY RIVER, N.F.	Temperature	Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 23 excursions beyond the criterion in 1995.
WA-39-2150	TEANAWAY RIVER, N.F.	Temperature	Numerous excursions beyond the criterion sampled by Wenatchee National Forest in 1994.;Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-2155	STAFFORD CREEK	Temperature	35 excursions beyond the criterion sampled by Wenatchee National Forest in 1994.;Yakama Indian

			Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-2200	TEANAWAY RIVER, M.F.	Temperature	Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 2 excursions beyond the criterion in 1993 and 51 excursions beyond the criterion in 1995.
WA-39-2250	TEANAWAY RIVER, M.F.	Temperature	Numerous excursions beyond the criterion sampled by Wenatchee National Forest in 1994.;Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.
WA-39-2300	TEANAWAY RIVER, W.F.	Temperature	Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show numerous excursions beyond the criterion between 1993 and 1995.
WA-39-2350	TEANAWAY RIVER, W.F.	Temperature	Numerous excursions beyond the criterion sampled by Wenatchee National Forest in 1994.;Yakama Indian Nation Tribal data (submitted by Carrol Palmer on 8/10/93) show multiple excursions beyond the criterion between 1990 and 1992.;Yakama Indian Nation data
WA-39-3000	MANASTASH CREEK	Instream Flow	USGS flow data from a gage near the mouth;U.S. Bureau of Reclamation, 1990;U.S. Fish and Wildlife, 1990;Yakima River Subbasin Plan, 1990;SASSI, 1993;Nehlson, et al. 1991.;The stream meets all the Water Quality Program criteria for inadequate instream flow
WA-39-3020	MANASTASH CREEK, S.F.	Temperature	Yakama Indian Nation data (submitted by Carroll Palmer on 2/28/96) show 18 excursions beyond the criterion in 1994.
WA-39-3025	MANASTASH CREEK, S.F.	Temperature	Numerous excursions beyond the criterion sampled by Wenatchee National Forest in 1992 and 1994.

APPENDIX B

Wildlife Species

Wildlife Species potentially inhabiting the Affected Areas of the Yakima River Basin

Mammals

Mule deer (*Odocoileus hemionus*)
elk (*Cervus canadensis*)
bighorn sheep (*Ovis Canadensis*)
Townsend ground squirrel (*Citellus townsendi*)
coyote (*Canus latrans*)
badger (*Taxidea taxus*)
black-tailed jackrabbit (*Lepus californicus*)
white-tailed jackrabbit (*Lepus townsendii*)
bobcat (*Lynx rufus*)
Small-footed myotis (*Myotis subulatus*)
northern grasshopper mouse (*Onychomys leucogaster*)
Ord's kangaroo rat (*Dipodomys ordii*)
Merriam shrew (*Sorex merriami*)
beaver (*Castor canadensis*)
mink (*Mustela vison*)
raccoon (*Procyon lotor*)
muskrat (*Ondatra zibethicus*)
striped skunk (*Mephitis mephitis*)
cottontail rabbit (*Lepus sylvaticus*)
w. harvest mouse (*Reithrodontomys megalotis*)
river otter (*Lutra canadensis*)
long-tailed vole (*Microtus longicaudus*)
black bear (*Ursus americanus*)
Great Basin pocket mouse (*Parognathus parvus*)
deer mouse (*Peromyscus maniculatus*)
northern pocket gopher (*Thomomys talpoides*)
Pacific mole (*Scapanus orarius*),
pallid bat (*Antrozous pallidus*)
Grizzly bear (*Ursus arctos*)
wolf (*Canus lupus*)
Moose (*alces alces*)
porcupine (*Erethizon dorsatum*)
Least chipmunk (*Eutamias minimus*)
Yellow-bellied marmot (*Marmota flaviventris*)
Yellow-pine chipmunk (*Tamias amoenus*)
Bushy-tail woodrat (*Neotomys cinerea*)
Long-tailed weasel (*Mustela frenata*)
Short-tailed weasel (*M. erminea*)
Whitetail deer (*O. virginianus*)

Birds

burrowing owl (*Athene cunicularia*)
long-billed curlew (*Numenius madagascariensis*)
chukar (*Alectoris chukar*)
greater sage-grouse (*Centrocerus urophasianus*)
common nighthawk (*Chordeiles minor*)
common poorwill (*Phalaenoptilus nuttallii*)

rock wren (*Salpinctes obsoletus*)
loggerhead shrike (*Lanius ludovicianus*)
western meadowlark (*Sturnella neglecta*)
green-tailed towhee (*Pipilo chlorurus*)
vesper sparrow (*Pooecetes gramineus*)
Brewer's sparrow (*Spizella breweri*)
sage sparrow (*Amphispiza belli*)
osprey (*Pandion halietus*)
Cooper's hawk (*Accipiter cooperi*)
Swainson's hawk (*Buteo swainsoni*)
Ferruginous hawk (*Buteo regalis*)
Western screech owl (*Megascops kennecotti*)
great blue heron (*Ardea herodias*)
bank swallow (*Riparia riparia*)
red-winged blackbird (*Agelaius phoeniceus*)
black swift (*Cypseloides niger*)
Wilson's phalarope (*Phalaropus tricolor*)
sora rail (*Porzana carolinus*)
American avocet (*Recurvirosta americana*)
black-crowned night-heron (*Nycticorax nycticorax*)
common snipe (*Gallinago gallinago*)
common yellowthroat (*Geothlypis trichas*)
dipper (*Cinclus mexicanus*)
peregrine falcon (*Falco peregrinus*)
California quail (*Callipepla californica*)
ruffed grouse (*Bonasa umbellus*)
American crow (*corvus brachyrhynchos*)
red-breasted sapsucker (*Sphyrapicus ruber*)
rufous hummingbird (*Selasphorus rufus*)
Pacific-slope flycatcher (*Empidonax difficilis*)
horned lark (*Eremophila alpestris*)
sage thrasher (*Oreoscoptes montanus*)
mourning dove (*Zenaida macroura*)
western kingbird (*Tyrannus verticalis*)
black-throated sparrow (*Amphispiza bilineata*)
lark sparrow (*Chondestes grammacus*)
golden eagle (*Aquila chrysaetos*)
bald eagle (*Haliaeetus leucocephalus*)
sharp-shinned hawk (*Accipiter striatus*)
American kestrel (*Falco sparverius*)
short-eared owl (*Asio flammeus*)
great horned owl (*Bubo virginianus*)
great egret (*Ardea alba*)
barn swallow (*Hirundo rustica*)
yellow-headed blackbird (*Xanthocephalus xanthocephalus*)
spotted sandpiper (*Actitis macularia*)
American coot (*Fulica americana*)
lesser yellowlegs (*Tringa flavipes*)
black-necked stilt (*Himantopus mexicanus*)
American bittern (*Botarus lentiginosus*)
bobolink (*Dolichonyx oryzivorus*)
marsh wren (*Cistothorus palustris*)
belted kingfisher (*Megaceryle alcyon*)
northern harrier (*Circus cyaneus*)
ring-necked pheasant (*Phasianus colchicus*)
killdeer (*Charadrius vociferous*)
red-naped sapsucker (*Sphyrapicus nuchalis*)
Vaux's swift (*Chaetura vauxi*)
calliope hummingbird (*Stellula calliope*)
Hammond's flycatcher (*Empidonax hammondii*)

dusky flycatcher (*Empidonax oberholseri*)
Swainson's thrush (*Catharus ustulatus*)
solitary vireo (*Vireo solitarius*)
fox sparrow (*Passerella iliaca*)
black-headed grosbeak (*Pheucticus melanocephalus*)
Northern oriole (*Icterus galbula galbula*)
Northern flicker (*Colaptes auratus*)
hairy woodpecker (*Picoides villosus*)
ash-throated flycatcher (*Myiarchus cinerascens*)
American goldfinch (*Carduelis tristis*)
yellow warbler (*Dendroica petechia*)
pie-billed grebe (*Podilymbus podiceps*)
common merganser (*Mergus merganser*)
gadwall (*Anas strepera*)
cinnamon teal (*Anas cyanoptera*)
American wigeon (*Anas americana*)
Canada geese (*Branta canadensis*)
mourning doves (*Zenaida macroura*)
rock dove (*Columba livia*)
brown-headed cowbird (*Molothrus ater*)
savannah sparrow (*Passerculus sandwichensis*)
veery (*Catharus fuscescens*)
western tanager (*Piranga ludoviciana*)
MacGillivary's warbler (*Oporornis tolmiei*)
red-breasted nuthatch (*Sitta canadensis*)
gray catbird (*Dumetella carolinensis*)
Eastern kingbird (*Tyrannus tyrannus*)
downy woodpecker (*Picoides pubescens*)
Lewis' woodpecker (*Melanerpes lewis*)
Lincoln's sparrow (*Melospiza lincolnii*)
Cassin's finch (*Carpodacus Cassinii*
mallard (*Anas platyrhynchos*)
white-crowned sparrow (*Zonotrichia leucophrys*)
Brewer's blackbird (*Euphagus cyanocephalus*)
blue-winged teal (*Anas discors*)
redhead (*Aythya americana*)
northern shoveler (*Anas clypeata*)
American robin (*Turdus migratorius*)
turkey vulture (*Cathartes aura*)
black-billed magpie (*Pica hudsonia*),
western bluebird (*Sialia mexicana*)
barn owl (*Tyto alba)*

Reptiles and Amphibians

western rattlesnake (*Crotalus virdis*)
Great Basin spadefoot toad (*Spea intermontana*)
northern sagebrush lizard (*Sceloporus graciosus*)
spotted frog (*Rana (= Lithobates) pretiosa*)
bullfrog (*Rana (= Lithobates) catesbeiana*)
gopher snakes (*Pituophis melanoleuces*)
rubber boa (*Charina bottae*)
striped whipsnake (*Masticophis taeniatus*)
short-horned lizard (*Phrynosoma douglasii*)
western painted turtle (*Chrysemys picta*)
Cascade frog (*Rana (= Lithobates) cascadae*)
tailed frog (*Ascaphus montanus*)
garter snake (*Thamnophis sirtalis*)
Pacific tree-frog (*Hyla* (*=Pseudacris) regilla*

APPENDIX C

Habitat Descriptions

Riparian: As used in this CAR, the term "riparian" is defined as the area adjacent to flowing waters that contain elements of both aquatic and terrestrial ecosystems which mutually benefit each other (WDFW 1995). They generally occur as relatively narrow linear units along aquatic habitats. Riparian zones typically include wetlands, such as palustrine emergent (PEM) palustrine forested (PFO) and palustrine scrub-shrub wetlands (PSS), riverine and in some cases lacustrine habitats (Cowardin 1979). Riparian areas also include forested and scrub-shrub habitats that are too dry to be classified as wetlands, gravel bars, and other stream related habitats and vegetation. Thus, palustrine, lacustrine, and riverine habitats would be considered a subset of the overall area described as the riparian zone in this CAR.

Wetlands: "In general terms, wetlands are lands where saturation with water is the dominant factor determining the nature of the soil development and the types of plant and animal communities living in the soil and at its surface. The single feature that most wetlands share is soil or substrate that is at least periodically saturated or covered with water. The water creates severe physiological problems for all plants and animals except those that are adapted for life in water or in saturated soil."

Grasslands: Unknown grass, fields, or meadows.

Shrub-Steppe: Undisturbed vegetation in the shrub-steppe habitat is dominated by big sagebrush as the principal &shrub and bluebunch wheatgrass as the principal grass Much smaller amounts of spiny hopsage three-tip sage and horsebrush may occur in the shrub layer.

Forested Lands:

Mixed Conifer Forest: Conifers and deciduous trees often grow together in our forests. A forest is considered mixed when each tree type makes up at least 30% of the canopy.

Hardwood Forest: Areas with at least 25% canopy coverage, of which at least 70% is composed of deciduous trees; usually composed of alder, maple and cottonwood in Seattle. The smaller size classes cover areas clinging to our many sliding hillsides or regenerating from previous disturbances, such as old clear cuts or old farms.

Old Growth Forest: In general, old-growth stands were 250 years or older and relatively undisturbed (less than 10 percent affected by logging or other activity). A more detailed definition was applied where availability of data made it possible. The main criteria were asfollows: 1. Mature and overmature trees present in the overstory. 2. Stands have a multi-storied canopy with trees iof different age classes. 3. Snags or down trees are present. 4. Human activities have not significantly altered the stand.

Agricultural Lands*:* Agricultural wildlife management entails landscape-level consideration of wildlife populations and habitats both on the farm and off, keeping habitat patches, connecting corridors and maintaining linkage to species genetic reservoirs a part of the plan.

APPENDIX D

Matrices Used to Evaluate Effects of the Action Alternative at the Programmatic Level

Numerical ratings were used to identify potential benefits and impacts to fish, wildlife, habitat resources within the project area; criteria established and illustrated in each of the matrices is as follows:

Elevated Benefit	Benefit	Neutral	Impact	Elevated Impact
2	1	0	-1	-2

Table 6. Potential effects on threatened and endangered species within the project area.

	Species	Gray Wolf	Canada Lynx	Grizzly Bear	Marbled Murrelet	Northern Spotted Owl	Ute ladies-tresses	Sage-grouse
Element	Location							
Fish Passage	Cle Elum	0	0	0	0	0	0	0
	Bumping	0	0	0	0	-2	0	0
	Clear Lake	0	0	0	0	0	0	0
	Tieton	0	0	0	0	0	0	0
	Keechelus	-1	-1	-1	-1	-1	0	0
	Kachess	-1	-1	-1	-1	-1	0	0
Structural & Operational Changes to Existing Facilities	Wapatox Improvements	0	0	0	0	0	0	0
	Subordinate Roza	0	0	0	0	0	0	0
	Subordinate Chandler	0	0	0	0	0	0	0

	Kittitas Main Canal	0	0	0	0	0	0	0
	Raise Cle Elum Pool	0	0	0	0	0	0	0
	K to K Pipeline	-1	-1	-1	-1	-1	0	0
	Remove Roza Dam	0	0	0	0	0	0	0
Surface Water Storage	Wymer Reservoir	0	0	0	0	0	0	-2
	Bumping Lake Enlargement	0	0	0	-2	-2	0	0
	Reservoir Inactive Storage	0	0	0	0	0	0	0
Groundwater Storage	Municipal Storage	0	0	0	0	0	0	0
	Groundwater Infiltration	0	0	0	0	0	0	0
Habitat Protection and Enhancements		1	1	1	1	1	0	2
Enhanced Water Conservation		0	0	0	0	0	0	0
Market Reallocaiton		0	0	0	0	0	0	0

Table 7. Potential effects of the Project Action on bull trout and bull trout critical habitat.

Project Element	River Reach	Water Quality	Habitat Access	Steam Ecology	Channel Condition	Floodplain Function	Flow/Hydrology	Watershed Condition
Fish Passage	AR Yakima	0	2	2	0	0	0	0
	AR Naches	0	2	2	0	0	0	0
	BR Yakima	0	0	1	0	0	0	0
	BR Naches	0	0	1	0	0	0	0
	Tributaries	0	0	0	0	0	0	0
Structural and Operational Changes	AR Yakima	0	0	0	0	0	0	0
	AR Naches	0	0	0	0	0	0	0
	BR Yakima	1	0	0	0	1	1	0
	BR Naches	1	0	0	0	0	1	0
	Tributaries	0	1	1	0	1	1	0
Surface Water Storage	AR Yakima	0	-1	0	0	0	0	0
	AR Naches	0	-2	0	0	0	0	-1
	BR Yakima	-1	0	1	1	1	1	0
	BR Naches	0	0	1	0	0	1	0
	Tributaries	0	0	0	0	0	0	0
Habitat Protection and	AR Yakima	1	1	1	0	0	0	1
	AR Naches	1	1	1	0	0	0	1

Enhancement	BR Yakima	1	0	1	0	1	0	1
	BR Naches	1	0	1	0	1	0	1
	Tributaries	1	2	2	0	1	0	2
Enhanced Water Conservation	AR Yakima	0	0	0	0	0	0	0
	AR Naches	0	0	0	0	0	0	0
	BR Yakima	0	0	0	0	0	1	0
	BR Naches	0	0	0	0	0	1	0
	Tributaries	0	1	1	0	1	1	0
Market-Based Reallocation	AR Yakima	0	0	0	0	0	0	0
	AR Naches	0	0	0	0	0	0	0
	BR Yakima	0	0	0	0	0	0	0
	BR Naches	0	0	0	0	0	0	0
	Tributaries	1	1	1	0	0	0	0

Table 8. Potential affects to resident and anadromous fish within the Yakima River basin.

Project Element	River Reach	Water Quality	Habitat Access	Steam Ecology	Channel Condition	Floodplain Function	Flow/Hydrology	Watershed Condition
Fish Passage	AR Yakima	0	2	2	0	0	0	0
	AR Naches	0	2	2	0	0	0	0
	BR Yakima	0	0	1	0	0	0	0
	BR Naches	0	0	1	0	0	0	0
	Tributaries	0	0	0	0	0	0	0

Structural and Operational Changes	AR Yakima	0	0	0	0	0	0	0
	AR Naches	0	0	0	0	0	0	0
	BR Yakima	1	0	0	0	1	1	0
	BR Naches	1	0	0	0	0	1	0
	Tributaries	0	1	1	0	1	1	0
Surface Water Storage	AR Yakima	0	-1	0	0	0	0	0
	AR Naches	0	-1	0	0	0	0	-1
	BR Yakima	-1	0	1	1	1	1	0
	BR Naches	0	0	1	0	0	1	0
	Tributaries	0	0	0	0	0	0	0
Habitat Protection and Enhancement	AR Yakima	1	1	1	0	0	0	1
	AR Naches	1	1	1	0	0	0	1
	BR Yakima	1	0	1	0	1	0	1
	BR Naches	1	0	1	0	1	0	1
	Tributaries	1	2	2	0	1	0	2
Enhanced Water Conservation	AR Yakima	0	0	0	0	0	0	0
	AR Naches	0	0	0	0	0	0	0
	BR Yakima	0	0	0	0	0	1	0
	BR Naches	0	0	0	0	0	1	0
	Tributaries	0	1	1	0	1	1	0

Market-Based Reallocation	AR Yakima	0	0	0	0	0	0	0
	AR Naches	0	0	0	0	0	0	0
	BR Yakima	0	0	0	0	0	0	0
	BR Naches	0	0	0	0	0	0	0
	Tributaries	1	1	1	0	0	0	0