BUREAU OF RECLAMATION

Yakima River Basin Programmatic Tributary Investigation Report

Yakima River Basin Water Enhancement Project
Yakima Project, Washington

U.S. Department of the Interior February 2020

Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

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

Cover Photo: Manastash Creek, a significant tributary in Kittitas County recently reconnected to the Yakima River.

ACRONYMS AND DEFINITIONS

AID	Ahtanum Irrigation District
BPA	Bonneville Power Administration
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
FPEIS	Final Programmatic Environmental Impact Statement
FR	Federal Register
Integrated Plan	Yakima River Basin Integrated Water Resource Management Plan
KCCD	Kittitas County Conservation District
KCT	Kittitas Conservation Trust
KRD	Kittitas Reclamation District
MCR	Middle Columbia River
NMFS	National Marine Fisheries Service
PEIS	Programmatic Environmental Impact Statement
Reclamation	Bureau of Reclamation
RM	river mile
TCC	Taneum Canal Company
Title XII	Title XII of Public Law 103-434, the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994, Yakima River Basin Water Enhancement Project
USFWS	U.S. Fish and Wildlife Service
WIP	Wapato Irrigation District
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation
YBFWRB	Yakima Basin Fish and Wildlife Recovery Board
YSPB	Yakima Subbasin Fish and Wildlife Planning Board
YTID	Yakima-Tieton Irrigation District
YRBWEP	Yakima River Basin Water Enhancement Project
YTAHP	Yakima Tributary Access and Habitat Program

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Executive Summary

This programmatic tributary investigation report meets the requirements of Public Law 103-434, the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP). In March 2019, Public Law 116-09, the John D. Dingell, Jr. Conservation, Management, and Recreation Act, authorized YRBWEP Phase III in Title VIII, Subpart C, and supports tributary enhancement described in Title XII of the 1994 Act.

Public Law 103-434 (hereinafter referred to as Title XII) describes tributary enhancement measures designed to increase fish abundance and productivity and improve irrigation reliability throughout the Yakima River basin. The Yakima River basin is in south-central Washington State (Figure 1) and supports agricultural production valued at more than $4.48 billion dollars (WSDA 2018)—one of the most productive agricultural areas in the State. The agriculture industry relies on developed irrigation projects that have impacted native populations of salmon, trout, and lamprey.

Figure 1. Location of the Yakima River basin

Historically, the Yakima River and its tributaries supported culturally and economically significant runs of Sockeye salmon (*Oncorhynchus nerka*), steelhead (*Oncorhynchus mykiss*), Coho salmon (*Oncorhynchus kisutch*) and Chinook salmon (*Oncorhynchus tshawytscha*). In addition to anadromous salmonids, the headwaters of Yakima River tributaries supported healthy populations of fluvial and adfluvial Bull Trout (*Salvelinus confluentus*) as well as Pacific Lamprey (*Entosphenus tridentatus*). Once extirpated from the basin, Sockeye, Coho salmon, and summer-run Chinook salmon are returning since being reintroduced through hatchery programs. Both Middle Columbia River (MCR) steelhead and Bull Trout are currently protected under the provisions of the Endangered Species Act (ESA) as threatened.

Historically, water rights within the Yakima River basin have been contentious, especially during times of drought. Water shortages and litigation among water users caused mistrust among State, Federal, Tribal, and local entities. This led to the adjudication of surface water rights starting in 1977 and YRBWEP legislation in 1979 (Act of December 28, 1979, Public Law 96–162, YRBWEP Feasibility Study) that authorized a feasibility study to include a U.S. Geological Survey (USGS) analysis of water supply data in the Yakima River basin. Thereafter, Section 109 of the Hoover Power Plant Act of 1984 (August 17, 1984, Public Law 98-381) authorized the Secretary of the Interior to, "design, construct, operate, and maintain fish passage facilities within the Yakima River basin." Fish passage and fish screen projects implemented via this Act are commonly referred to as YRBWEP Phase I. YRBWEP Phase II legislation was passed in 1994 and authorizes water conservation and instream flow needs for fish (YRBWEP Act of October 31, 1994, Public Law 103-434, Title XII).

In 2009, the Bureau of Reclamation and the Washington State Department of Ecology (Ecology) in collaboration with the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) created the YRBWEP Workgroup to facilitate locally driven consensus-based solutions, while stakeholders provided input into project development. The mutually beneficial projects developed through the YRBWEP Workgroup are referred to as the Yakima Basin Integrated Plan (Integrated Plan). The Integrated Plan along with the final adjudication of water rights is relieving tensions among water right holders and creating a collaborative working environment in the basin. The Integrated Plan is referred to as YRBWEP Phase III, and several Integrated Plan projects are currently progressing.

Through Title XII, Reclamation is tasked with protecting, mitigating, and enhancing fish and wildlife through improved water management and improved reliability of water supply for irrigation. In preparing this report, Reclamation consulted with Ecology, the Yakama Nation, Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), irrigation districts, and other water users to identify tributaries where enhancement would benefit all parties. In addition, Reclamation evaluated existing data and reports including the following: *Yakima River Basin Water Enhancement Project Final Programmatic Environmental Impact Statement January 1999* (Reclamation, 1999, herein referred to as the *YRBWEP FPEIS 1999),* and the *Yakima*

River Basin Integrated Water Resource Management Plan Final Programmatic Environmental Impact Statement March 2012 (Reclamation and Ecology 2012, herein referred to as the *Integrated Plan FPEIS 2012*) to identify locations and actions for potential tributary enhancement projects.

After thorough evaluation, Reclamation identified Yakima River tributaries where enhancement actions, when implemented, could achieve the objectives of Title XII, Section 1207, and provide major benefits for the agricultural community and fishery resources—including ESA-listed species. Implementation of actions associated with each tributary project will include outreach to affected water users to gain their participation, as well as coordination with the Yakama Nation, USFWS, NMFS, Ecology, WDFW, and others to gain consensus on the best course of action for tributary enhancement.

Title XII requires Reclamation to submit a report to the appropriate Congressional committees before funds can be appropriated for a proposed tributary enhancement project. This investigative report was prepared to meet the legislative requirements of Title XII, efficiently and effectively, while providing flexibility to take advantage of enhancement opportunities as they arise. This report was released in draft form for public review and comment on August 1, 2018 and all comments received were addressed. Reclamation identifies a program of potential tributary enhancement projects in this investigation report; specifically, the objectives and benefits of implementing the actions identified in this report are as follows:

Objectives:

- Identify efficient and effective means to provide tributaries with increased instream flow for fish
- Assist in recovery of ESA-listed MCR steelhead and Bull Trout

Benefits:

- Increase efficiency in irrigation water use
- Improve operational flexibility for agricultural water users throughout the Yakima River basin

This report was developed with input from State, Federal, Tribal, and local entities and is similar to previously submitted reports describing successful YRBWEP tributary enhancement projects such as those in Taneum Creek and Manastash Creek (discussed in Section 2.1). At the Federal level, this investigation report will be submitted to the U.S. Senate Committee on Energy and Natural Resources and the U.S. House of Representatives Committee on Natural Resources, as required. It will also be submitted to the Governor of the State of Washington and made available to the Yakama Nation, other stakeholders, and the public.

Letters of support have been submitted by the Yakama Nation, NMFS, USFWS, WDFW, Yakima Basin Joint Board, YRBWEP Workgroup Habitat Subcommittee, Kittitas Reclamation District,

Kittitas County Conservation District, Yakima Basin Fish and Wildlife Recovery Board, Trout Unlimited, and the Roza Irrigation District (see Appendix A).

Chapter 1. Purpose

This programmatic investigation report identifies potential tributaries to enhance water supplies and improve habitat conditions throughout the Yakima River basin. It was prepared to meet the requirements of Public Law 103-434, the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994, Title XII, Yakima River Basin Water Enhancement Project (YRBWEP). In March 2019, Public Law 116-09, the John D. Dingell, Jr. Conservation, Management, and Recreation Act, Title VIII, Subpart C, authorized YRBWEP Phase III and supports tributary enhancement in Title XII of the 1994 Act.

Public Law 103-434 (hereinafter referred to as Title XII) requires Reclamation to submit a report to the appropriate Congressional committees before funds are appropriated for a tributary project. This report meets Title XII requirements, efficiently and effectively, and identifies a tributary enhancement program that provides flexibility to advance enhancement opportunities as they arise. While developing specific projects, Reclamation will provide opportunities for Tribal, stakeholder, and public water users to participate in the process. Implementation of any tributary project will be contingent upon agreement and voluntary participation with water right holders.

Chapter 2. Background

A combination of Federal and State statutes, regulations, and court orders determines water management in the Yakima River basin. Under the Reclamation Act of 1902, Congress authorized the U.S. Reclamation Service (now, Bureau of Reclamation) to construct reservoirs and develop irrigation facilities within the basin, known as the Yakima Project.

The Yakima Project has seven divisions: six irrigation divisions (Kittitas, Roza, Tieton, Wapato, Sunnyside, and Kennewick) and one storage division. The six irrigation divisions provide water to about 465,400 irrigated acres and manage about 70 percent of the river diversions in the Yakima River basin. The remaining 30 percent of the river diversions are managed by irrigation entities that hold mostly senior water rights. The storage division has five major reservoirs with a capacity of about 1,065,400 acre-feet and a sixth reservoir, Clear Lake, with a capacity of 5,300 acre-feet primarily used for recreation.

The five major reservoirs—Bumping Lake, Kachess, Keechelus, Rimrock (Tieton Dam), and Cle Elum—store and release water to meet irrigation demands, flood control, and instream flow requirements for fishes. Other Yakima Project features include five major diversion dams, 420 miles of canals, 1,697 miles of laterals, 30 pumping plants, 144 miles of drains, two federally owned powerplants, plus fish passage and protection facilities throughout the project. Besides providing water for irrigation, the Yakima Project provides hydroelectric power generation, flood control, benefits to fish and wildlife, and recreation. Unused storage water is carried over to the following year to benefit water users and fishery resources.

In 1977, drought in the basin prompted legislative action for additional water supply. In 1979, the Washington State Legislature provided $500,000 for, "… preparation of feasibility studies related to a comprehensive water supply project designed to alleviate water shortage in the Yakima River basin." In addition, the U.S. Congress authorized, funded, and directed the Secretary of the Interior to, ". . . conduct a feasibility study of the Yakima River Basin Water Enhancement Project in cooperation with the State" (Act of December 28, 1979, Public Law 96–162, YRBWEP Feasibility Study).

Congress enacted the Hoover Power Plant Act of 1984 (Public Law 98-381), Section 109 of which authorized Reclamation to construct fish passage and protective facilities in the Yakima River basin. Fish passage and fish screen projects implemented via this Act are commonly referred to as YRBWEP Phase I. A renewed interest in water conservation and instream flows for fish arose in 1990, leading to the eventual 1994 Title XII legislation authorizing these non-storage elements (YRBWEP Phase II). YRBWEP was amended by Public Law 105-62, October 13, 1997; Public Law 106-372, October 27, 2000; and Public Law 116-9, March 12, 2019. Title XII provides for the following:

- To protect, mitigate, and enhance fish and wildlife through improved water management; improved instream flows; improved water quality; protection, creation and enhancement of wetlands; and by other appropriate means of habitat improvement
- To improve the reliability of water supply for irrigation
- To authorize a Yakima River Basin Water Conservation Program
- To provide implementation by the Yakama Nation of an irrigation demonstration project, Wapato Irrigation Project improvements, and a Toppenish Creek Corridor enhancement project

Title XII states that conserved water resulting from the expenditure of Federal funds shall not be used to expand irrigated lands in the Yakima River basin except as specified in Section 1204(a)(3) for action on the Yakama Reservation. Reclamation operates the Yakima Project according to the U.S. Yakama Treaty obligations to deliver the Yakama Nation's time immemorial, priority-date water right for fish and other aquatic life according to court orders. This is the most senior water right in the basin, and while technically unquantified, the water right is defined by an Order of the Superior Court of Washington (July 17, 1990) as, "the specific minimum instream flow necessary to maintain anadromous fish life in the Yakima River." It was later extended to specifically include all Yakima River tributaries that support fish availability in the Yakama Nation's usual and accustomed fishing locations (i.e., the entire Yakima River basin).

Reclamation released the *YRBWEP FPEIS 1999* and the signed *Record of Decision* in 1999 (Reclamation, 1999). Reclamation and Ecology released the *Integrated Plan FPEIS 2012* in March 2012 (Reclamation and Ecology, 2012). The *Record of Decision for the Integrated Plan FPEIS 2012* was signed in July 2013. The *Integrated Plan FPEIS 2012* evaluated

previous studies on the Yakima River tributaries and mainstem river reaches throughout the basin as part of the Habitat Watershed Protection and Enhancement Element. It was concluded that implementing tributary enhancement actions in the proposed areas would achieve the objectives of Title XII Section 1207 legislation (Enhancement of Water Supplies for Yakima Basin Tributaries) and produce significant benefits for agriculture and fishery resources (including ESA-listed species). As specific actions authorized by Title XII are pursued, NEPA compliance documents will be prepared and tiered from the *YRBWEP FPEIS 1999* and the *Integrated Plan FPEIS 2012*, as appropriate.

2.1 Tributary Enhancement Achievements

In recent years, individual tributary enhancement projects have been completed in conjunction with Title XII and the Integrated Plan. The previously completed Taneum Creek and Manastash Creek projects discussed in this section demonstrate the success that can be achieved using Title XII Section 1207. These two projects have opened spawning habitat to an increasing number of steelhead returning to the upper Yakima River basin (Figure 2), which aids in recovery of threatened, native fish species. These enhancement successes are exemplary achievements under the authorizations set forth in Title XII Section 1207.

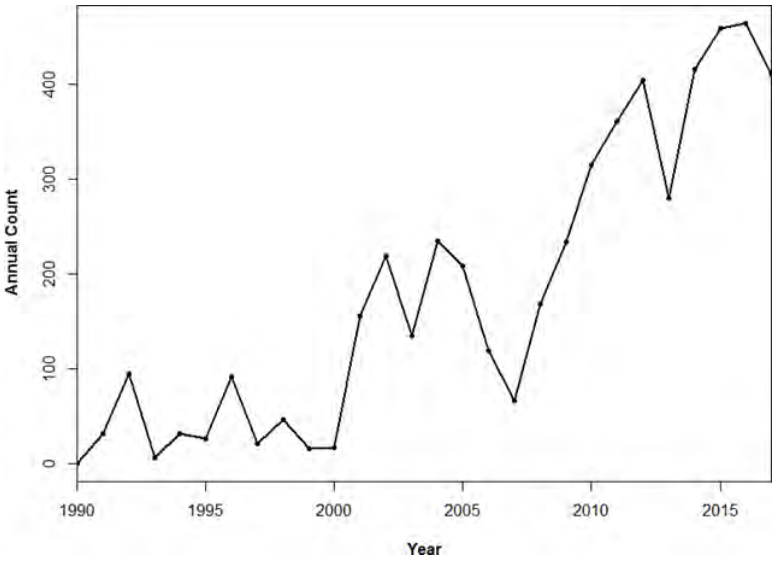

Figure 2. Number of adult steelhead migrating upstream past Roza Dam in the Yakima River. Habitat restoration, fish passage, water conservation, and water exchange projects implemented in tributaries (Taneum Creek, Teanaway River, and elsewhere) have contributed to improvements in steelhead production.

2.1.1 Taneum Creek Tributary Enhancement

The *Taneum Creek Study: Bruton-KRD Water Exchange Project* (Monk, 2009) was prepared after the *Record of Decision* for the *YRBWEP FPEIS 1999*. In June 2009, Reclamation submitted the Taneum Creek study to the appropriate Congressional committees and others, as required. The Taneum Creek project was the first project implemented under Title XII.

The Taneum Creek project addressed two irrigation structures in Taneum Creek: the Taneum Canal Company (TCC) Diversion, and the Bruton Diversion Dam. Both structures prevented salmon and steelhead from accessing high-quality upstream habitat (Figure 3). When the TCC Diversion was built in 1910, it created a passage barrier for upstream and downstream fish movement, effectively extirpating steelhead and salmon from the watershed. Bruton Diversion Dam was built without fish passage in 1965, and the diverted, unscreened water trapped migrant fish downstream in the canal system. In addition, water diverted by the TCC and other irrigation diversions caused chronic dewatering in Taneum Creek. Furthermore, the TCC stock-water right, when exercised, often dewatered Taneum Creek outside the irrigation season.

In 1989, Reclamation constructed a fish ladder at Bruton Diversion Dam to improve fish passage and screened Bruton Ditch to exclude fish under the authority of the Hoover Powerplant Act of 1984 (Title I Section 109 of Public Law 98-381, August 17, 1984). However, the fish ladder functioned only during high flows and was costly to maintain. In 2009, Reclamation, the Yakima Tributary Access and Habitat Program (YTAHP), Kittitas Conservation Trust (KCT), Salmon Recovery Funding Board (SRFB), Bonneville Power Administration (BPA), Ecology, Kittitas Reclamation District (KRD), and others implemented the Taneum Creek Tributary Enhancement Project authorized under Title XII. KCT received a grant to remove the Bruton Diversion Dam (Figure 3–5) and replace it with a roughened channel. In addition, the TCC Diversion Dam upstream from Bruton Diversion Dam was modified with improved fish passage.

These actions improved fish passage and opened 30 miles of critical habitat to native fishes, which provided the opportunity for restoration of steelhead runs (Monk, 2017). In addition, a complementary water exchange project involving Washington Water Trust, Reclamation, and Ecology was implemented to allow the KRD to deliver water to the Bruton Ditch thereby providing irrigation and stock water to nearby water users. Project partners agreed to drill a well, build a pressurized pipeline, and complete legal agreements for water right transfers that protect creek water in trust. These actions contributed to the observed, positive trend in juvenile fish production in Taneum Creek and to the number of adult steelhead returning to the upper Yakima River as shown in Figure 2. This project allowed participating water users to receive a more reliable, irrigation water supply through a pressurized pipeline, and they no longer needed to divert water from Taneum Creek. Since the project was completed in 2011, Taneum Creek is no longer dewatered, and fishes migrate freely throughout the watershed (Figure 5). Pipeline design and construction costs approximately $500,000. Dam removal and roughened channel construction was an additional $450,000.

Figure 3. Taneum Creek at Bruton Diversion Dam prior to dam removal. The dam was 1.6 miles from the mouth of the creek. It had been constructed in the late 1960s without fish passage facilities

Figure 4. Bruton Diversion Dam removal in process in 2009

Figure 5. Fish migrate freely through the roughened channel on Taneum Creek after removal of Bruton Diversion Dam.

2.1.2 Manastash Creek Tributary Enhancement

Irrigation development in Manastash Creek had a significant adverse impact on aquatic habitat and extirpated nearly all salmon and steelhead in the watershed. To protect native fishes, Kittitas County Conservation District (KCCD), Reclamation, Ecology, WDFW, Yakama Nation, and local irrigators determined the highest priority for the creek was to address fish passage barriers and dewatering. KCCD had already been working with landowners to improve fish passage and water conservation for more than 12 years.

In March 2013, the *Manastash Creek Investigation Report*, developed by Reclamation and partners, explored options for enhancing water supply for fish and irrigation in Manastash Creek. It was submitted to Congressional committees and others as required by Title XII Section 1207 (Reclamation, 2013). The Manastash Creek Tributary Enhancement project was the first Integrated Plan construction project after the *Record of Decision* for the *Integrated Plan FPEIS 2012* was signed in July 2013.

This project replaced an unlined, open-ditch lateral with 3.2 miles of pressurized pipeline in the KRD South Branch Canal. It conserved an estimated 1,300 acre-feet of water and created the capacity for KRD to deliver water to Manastash Creek, which increased summer streamflow by an average of 4 to 5 cfs. Completion of this pipeline also allowed removal of the Reed Diversion Dam in 2016, the last fish-passage barrier in lower Manastash Creek. Bull Trout, steelhead, salmon, and Lamprey now access over 20 miles of previously unavailable spawning and rearing habitat. The project resulted in increased primary production vital for supporting fisheries resources.

2.1.3 Cowiche Creek Water Exchange Project

The Cowiche Creek project illustrates how Reclamation facilitated enhancement actions among multiple stakeholders for a mutually beneficial outcome without contributing to construction costs.

Cowiche Creek is a tributary to the Naches River located in the middle of the basin. The Yakima Basin Fish and Wildlife Recovery Board identified Cowiche Creek as having significant potential for producing steelhead and Coho salmon (YBFWRB, 2009), but impassable diversion dams excluded steelhead and other fishes from accessing spawning habitat until passage improvement projects were implemented. The watershed had been considerably degraded and disconnected from its floodplain causing annual dewatering in stream sections primarily due to irrigation diversions. Reclamation collaborated with the Yakima-Tieton Irrigation District (YTID) and area natural resource managers to allow the Cowiche Creek Water Users Association to obtain their water supply from the Tieton River via the YTID diversion. This left Cowiche Creek water instream, eliminated the annual dewatering problem, and facilitated passage of migratory fishes such as steelhead.

In 2014, YTID and North Yakima Conservation District installed two turnouts to distribute water to roughly 400 acres within the Cowiche Creek Water Users Association. These turnouts enhanced streamflow in Cowiche Creek and allowed project partners to remove fish passage barriers, opening 25 miles of critical habitat for steelhead.

Reclamation and the YRBWEP Workgroup members participated in this enhancement project by reviewing legal issues associated with conveying non-Yakima Project water rights through YTID. Fish passage improvement projects were implemented by the YTAHP. An innovative funding approach supported the Cowiche Creek Water Exchange Project. Funding sources included the BPA and the Washington State Salmon Recovery Funding Board through a grant to North Yakima Conservation District.

2.2 Tributary Enhancement in Progress

2.2.1 Toppenish Creek Proposed Tributary Enhancement Project

The Toppenish Creek watershed comprises nearly one-third of the 1.3-million-acre Yakama Nation Reservation and 10 percent of the Yakima River basin. Most of the Tribal population live within this watershed. As such, Toppenish Creek has long been a critical source of natural and cultural resources for the Yakama people; however, it has experienced significant degradation from agricultural development and land conversion in the Toppenish Valley. Title XII Section 1204(c) authorized enhancement of this tributary.

A draft Toppenish Creek Corridor Enhancement Project Plan calls for restoration to natural conditions, to the extent possible, within the modern development context including irrigated agriculture. The draft plan proposes actions to reduce irrigation influences on streams, restore channels and floodplains, and restore native riparian and wetland vegetation.

The draft plan was prepared by the Yakama Nation Department of Natural Resources in August 2012, "to demonstrate the integrated management of agricultural, fish, wildlife, and cultural resources to meet Tribal objectives." The Tribal Council approved this project in 2019, and restoration projects are underway.

Chapter 3. Prior Investigations and Activities in Yakima Basin

Reclamation works with stakeholders and natural resource managers within the Yakima basin to enhance flows for fish and ensure the reliability of the water supply for out-of-stream uses. Reclamation's actions for tributary enhancement are connected to various plans and studies developed by project partners, water users, and resource managers within the Yakima River basin. Some of these plans are discussed below.

The Reaches Project: Ecological and Geomorphic Studies Supporting Normative Flows in the Yakima River Basin, Washington (Stanford et al. 2002). The Reaches Project evaluated the ecology of major floodplain reaches of the Yakima River (Cle Elum, Kittitas, Naches, Union Gap and Wapato). The study documented groundwater-channel connectivity and flow relations; quality and use of side-channel habitat by salmonids; and classification and analysis of floodplain habitat. Results of this study include the following:

- Ground-surface water connections were present in all five floodplains, and the upwelling from groundwater contributed to more stable thermal regimes.
- Reduced mainstem flows reduced side-channel habitat, which in-turn reduced the quality and productivity of the system.
- The Wapato Floodplain (Union Gap to Mabton) is the most complex and physically intact reach but the most dewatered and incised due to loss of sediment loading from upstream.
- All five reaches have significant potential for restoration. Restoration potential is highest in the Union Gap Reach. The Wapato Reach could be substantially restored, if the irrigation scheme was improved.
- There is insufficient water in the Yakima system to meet the needs of both current diversion rates and activation of floodplains. Alternative strategies are needed.
- The only means to attain normative flow conditions in the basin is to increase water supply, if the existing diversions are maintained.

The *KRD Water Conservation Plan* (KRD, 1999). The Kittitas Reclamation District (KRD) is part of Reclamation's Yakima Project. The district provides water to approximately 60,000 acres of farmland. KRD completed this plan in 1999 to conserve water. KRD subsequently completed a feasibility investigation that identified the potential use for conserved water to enhance fish habitat in tributary streams (Reclamation, 2011). KRD canal modifications to reduce seepage and enhance tributary flows are specific priorities discussed in the *Integrated Plan FPEIS 2012* and the *Record of Decision for the Integrated*

Plan FPEIS 2012 signed in July 2013. KRD's location in relationship to many important tributaries in the upper Yakima River basin renders them uniquely situated to provide multiple benefits for improving water supply for agriculture and fish.

Implementation of this plan would eventually save 123,094 acre-feet of water, and projects would be constructed in phases as funds become available. KRD improvements, beginning with the North Branch Canal lining, will play a significant role in meeting the conservation goals of the Integrated Plan's objectives. Since 2015, KRD has developed and implemented a tributary supplementation project annually to enhance water supplies for tributaries in the upper Yakima River basin (Figure 6). The KRD Tributary Supplementation Program is recognized by the Memorandum of Agreement (MOA) No. R16MA13720, signed by Reclamation, Ecology, and KRD. A committee comprised of fisheries resource agencies, Yakama Nation, KRD, Reclamation, and Ecology annually advise the MOA signatories on managing the program. The supplementation program has already yielded positive results. In fall 2018, a Chinook redd was observed in Little Creek, a stream that, historically, would have been dry without the supplementation program. In addition, both juvenile and adult steelhead were detected using this creek.

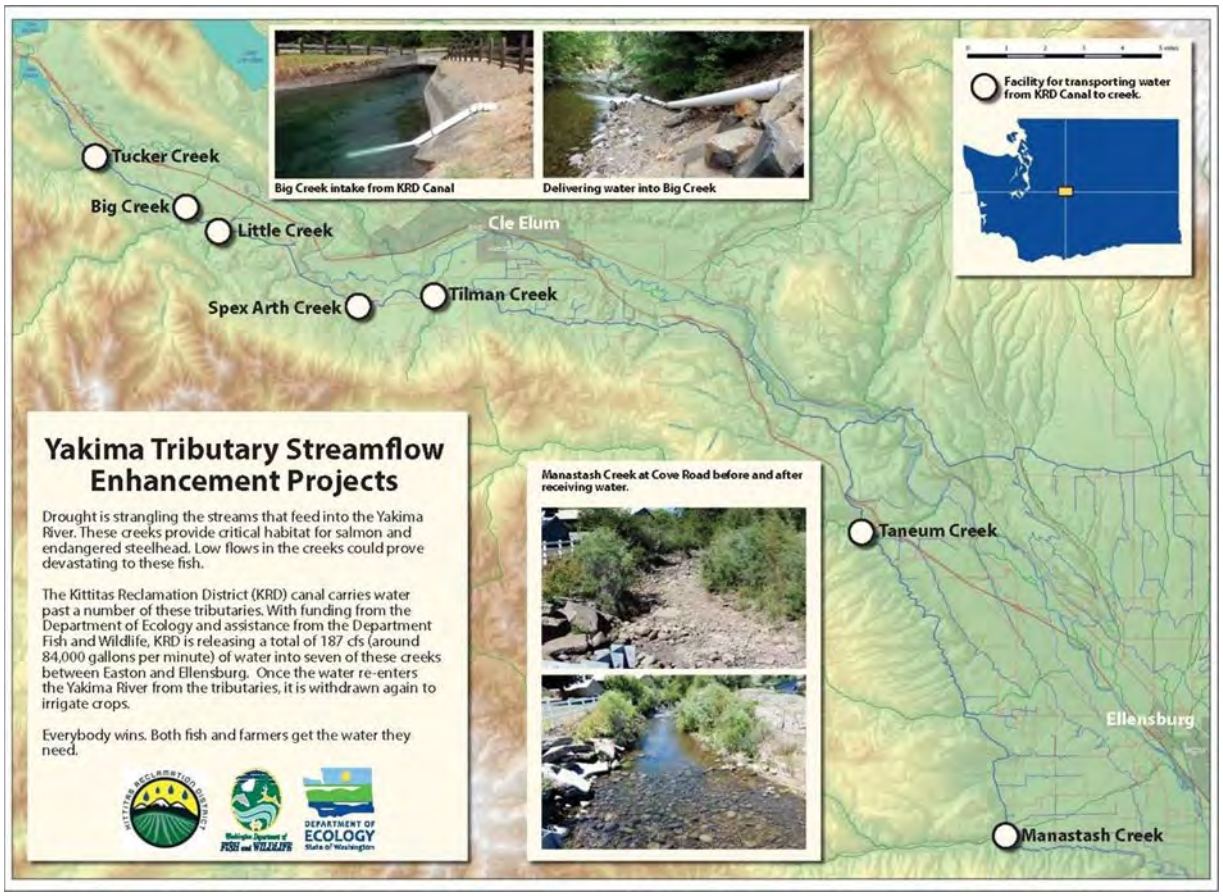

Figure 6. Yakima River tributaries currently enhanced by conserved water delivered through the KRD Canal

Middle Columbia River Steelhead Distinct Population Segment Endangered Species Act Recovery Plan (NMFS, 2009). *The Yakima Basin Steelhead Recovery Plan* was written by local partners convened by the Yakima Basin Fish and Wildlife Recovery Board, and then the plan was incorporated into the *Middle Columbia River Steelhead Distinct Population Segment (DPS) Recovery Plan*. This plan presents detailed empirical data about the status, distribution, characteristics, and life history of Yakima River basin steelhead. MCR steelhead were listed as threatened on March 25, 1999 (64 Federal Register [FR] 14517), and their threatened status was reaffirmed on January 5, 2006 (71 FR 834). NMFS designated critical habitat for MCR steelhead on September 2, 2005 (70 FR 52630). Steelhead are divided into four populations within the basin: Satus Creek, Toppenish Creek, Naches River, and upper Yakima River. This plan reviews factors for their decline in each population and identifies goals, criteria, actions, and strategies for their recovery.

Yakima River Basin Integrated Water Resource Management FPEIS (Reclamation and Ecology, 2012); *Record of Decision for the Yakima River Basin Integrated Water Resource Management FPEIS (*signed July 2013); and the *Yakima River Basin Integrated Water Resource Management Plan Framework for Implementation* (HDR et al. 2012) guide the Integrated Plan. Reclamation and Ecology recommended further refinements and identified specific tributaries for enhancement; several needed passage and habitat restoration actions.

Yakima Bull Trout Action Plan 2017 Action Update (YBFWRB, 2017). The Yakima Bull Trout Workgroup was convened to develop the *Yakima Bull Trout Action Plan*. The plan was completed in 2012 and updated in 2017 (Reiss et al., 2012). The Yakima Bull Trout Workgroup is committed to maintaining the 2017 update as an action database and living document. The plan is reviewed annually to hold partners accountable, identify completed work, and determine if further actions are needed. Yakima Basin Fish and Wildlife Recovery Board identifies and prioritizes specific actions that benefit Bull Trout populations in the Yakima River basin. The plan describes population status, trends and distribution, habitat requirements, and a detailed analysis of threats by life stage for each population. It also includes specific monitoring and restoration actions that address these threats including translocation.

Bull Trout Enhancement (Reclamation, 2017). This report connects the *Yakima Bull Trout Action Plan* to several tributary enhancement projects related to the Integrated Plan and is a framework to improve resiliency in Bull Trout populations within the Yakima River basin. The *Bull Trout Enhancement* report has two types of actions: (1) on-the-ground projects that improve Bull Trout habitat, and (2) assessments and designs that define future efforts to increase Bull Trout populations.

Manastash Creek Corridor Habitat Enhancement and Flood Hazard Reduction Plan (Herrera and Watershed, 2013). The KCCD conducted a reach-scale assessment of Manastash Creek that identified opportunities to improve aquatic habitat and reduce flood hazards. This corridor-plan engaged stakeholders to collaboratively document factors that

limited fish production, identified flood hazards, developed measures to reduce flood damages, and identified habitat restoration opportunities.

Naneum, Wilson, and Cherry Creek Watershed Assessment (Jacobs, 2017). The objective of this assessment was to gather information and develop an understanding of fish, habitat, irrigation, water quality, flow conditions, and flood issues within each watercourse and subbasin of the Naneum, Wilson, and Cherry Creek watersheds. The assessment summarizes data, describes uses and limitations, and identifies key data gaps. It also makes recommendations for projects or actions that should be pursued immediately, ongoing actions that should continue, and future actions that need additional planning and study.

Yakima Basin Fish Passage Barrier Synthesis (McCormick and Conley, 2017). This report compiles and evaluates a comprehensive list of fish passage barriers and their status throughout the basin. Data on fish passage barriers were compiled from 12 different sources. This report was prepared for the Yakima Basin Fish and Wildlife Recovery Board, which also made recommendations to develop and update a comprehensive fish passage dataset across Yakima River basin agencies.

Yakima Steelhead Recovery Plan (YBFWRB, 2009). The Yakima Basin Fish and Wildlife Recovery Board's plan identified factors for MCR steelhead decline, set recovery goals, and identified actions to achieve recovery goals. This plan serves to guide restoration of MCR steelhead in the Yakima River basin.

Yakima Subbasin Plan (YSPB, 2004). This plan describes ways in which BPA can mitigate for impacts on fish and wildlife resources in the Yakima River basin from the Federal Columbia River Power System (FCRPS). The plan prioritizes strategies for restoration of degraded habitat. Identified restoration actions include, but are not limited to, reconnection of fragmented habitat, increases in instream flow, augmentation of natural and artificial water storage, and restoration of sediment transport and large woody debris.

Yakima Tributary Access Habitat Program Strategic Plan (YTAHP, 2017). This plan was developed to restore salmonid passage, protect fish from entrainment, and enhance riparian and instream habitat within the Yakima River basin. The primary objectives identified are to screen water diversion to prevent entrainment, provide fish passage and manmade barriers, enhance habitat, and assist landowners who volunteer to improve habitat conditions. YTAHP is supported by BPA's Fish and Wildlife Program, other government entities, and private entities.

Chapter 4. Key Tributaries and Recommended Measures

This section discusses key tributary enhancement measures recommended by stakeholders and resource managers. Reclamation identifies and discusses the following five watershed areas: Tributaries above Upper Reservoirs (Section 0); Upper Yakima River Tributaries North (Section 0); Upper Yakima River Tributaries South (Section 4.3); Middle Yakima River Tributaries (Section 4.4); and Lower Yakima River Tributaries (Section 4.5).

See Appendix B for corresponding maps and tables of each watershed indicating types of projects that may be undertaken as part of tributary enhancement. Title XII states that Reclamation may implement a wide variety of measures to achieve project goals including, but not limited to, the following:

- Water-use efficiency improvements
- Use of Yakima Project canals and facilities to convey project or non-project water
- Construction, operation, and maintenance of groundwater wells
- Purchase of water rights from willing sellers
- Restoration of stream habitats

Reclamation and Ecology intend to implement YRBWEP habitat enhancement measures by following the hierarchy described by Roni and others (Roni et al., 2002), who conducted a review of watershed restoration strategies commonly applied in the Pacific Northwest where millions of dollars are spent annually to increase fish populations. They recommend watershed restoration that focuses on (1) protecting existing high-quality habitats, (2) restoring access to habitats that were isolated by manmade or natural barriers, (3) restoring hydrologic, geologic, and riparian processes, (4) short-term improvements such as adding wood, boulders, or other active measures to improve habitat. Habitat restoration is frequently opportunistic and dependent upon local factors such as land ownership and the landowner's willingness to participate; therefore, this hierarchy is useful as guidance but often cannot be followed in sequence.

Based on previous investigations provided in Chapter 3, there are known actions for many of the tributaries that have been identified for tributary enhancement. However, there will be continuing need for assessments to address tributaries not discussed in these documents. In addition, post enhancement assessments may be needed for dynamic management.

Tributary areas (Figure 7) are described and discussed in this section, and assessments that may be necessary are acknowledged. Table 1 shows the tributary enhancement actions needed in each of the five watershed areas.

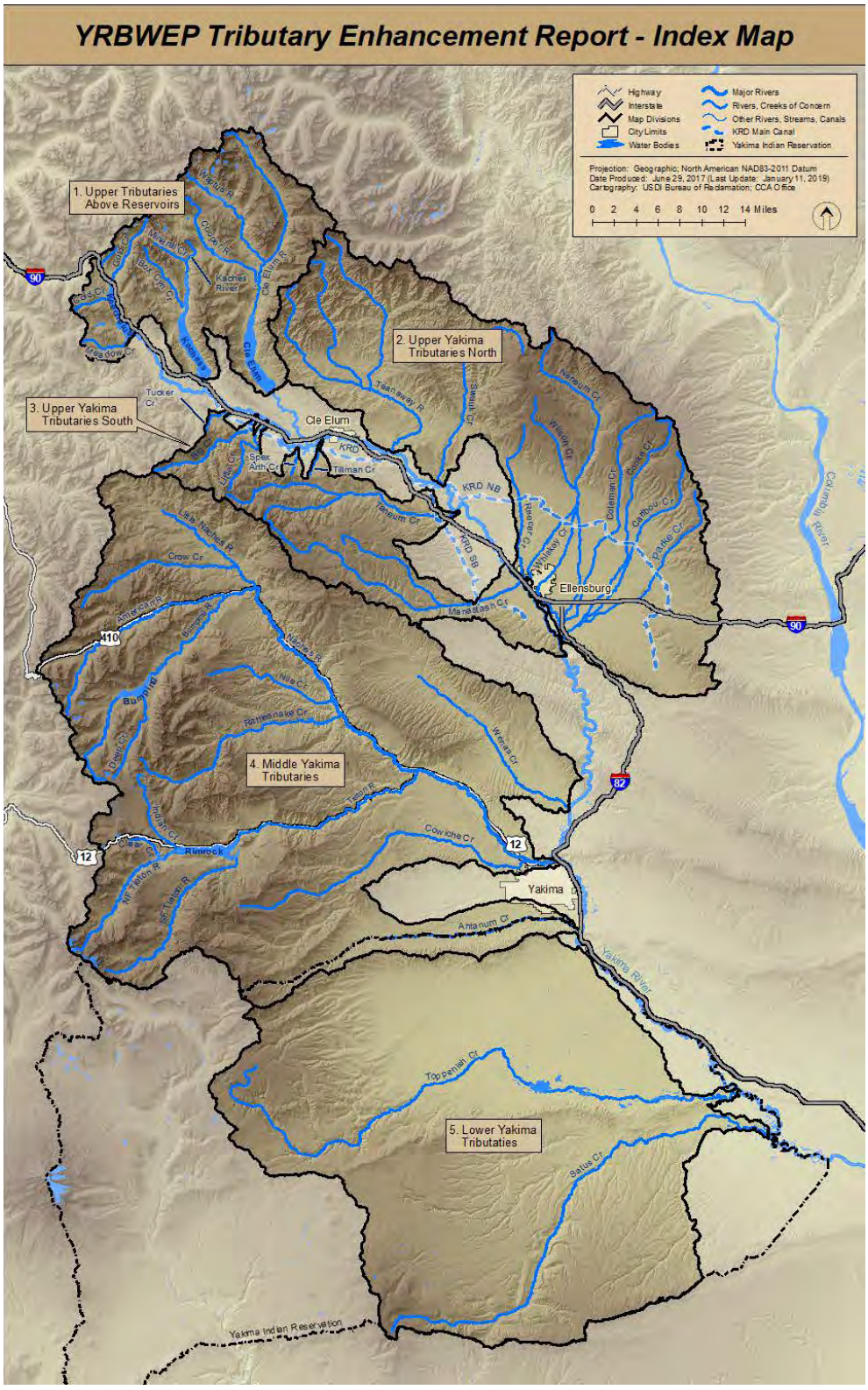

Figure 7. Yakima River basin reservoir and tributary areas: Tributaries Above Upper Reservoirs; Upper Yakima River Tributaries North; Upper Yakima River Tributaries South; Middle Yakima River Tributaries; and Lower Yakima River Tributaries

Table 1. Yakima River tributary areas (Figure 7) and their descriptions. Location of tributary enhancement actions are shown on maps of each tributary area in Appendix B

Tributary Area	Section	Map in Appendix B	Description
Tributaries Above Upper Reservoirs	0	Figure 8	Tributaries flowing into Kachess, Keechelus, and Cle Elum reservoirs.
Upper Yakima River Tributaries North	0	Figure 9	Tributaries flowing into the Yakima River on the north side of Kittitas Valley below Kachess, Keechelus, and Cle Elum reservoirs and above the Roza Diversion Dam.
Upper Yakima River Tributaries South	4.3	Figure 10	Tributaries flowing into the Yakima River on the south side of Kittitas Valley below Kachess, Keechelus, and Cle Elum reservoirs and above the Roza Diversion Dam.
Middle Yakima River Tributaries	4.4	Figure 11	Tributaries to the Yakima River between Roza Diversion Dam and Sunnyside Diversion Dam. This includes the Naches River watershed (including Tieton River and tributaries), Wenas Creek, and Ahtanum Creek.
Lower Yakima River Tributaries	4.5	Figure 12	Toppenish and Satus creeks that flow into the lower Yakima River south of Toppenish.

4.1 Tributaries Above Upper Reservoirs

This section describes tributaries in the upper Yakima River basin that flow into Keechelus, Kachess, and Cle Elum reservoirs (Appendix B, Figure 8). Tributary enhancement includes the following:

- Tributaries to Keechelus Reservoir include Gold, Cold, Coal, and Meadow creeks. Gold Creek is the only tributary that currently supports a known spawning population of Bull Trout. Cold, Coal, and Meadow creeks are smaller tributaries that may have suitable habitat for Bull Trout and other fish species. Cold Creek has a known fish passage barrier (suspended box culvert on the John Wayne Pioneer Trail), while Coal and Meadow creeks have been altered by road and forest management actions and need further investigation for habitat restoration. Dewatering of Gold Creek is a major issue for Bull Trout. During construction of I-90, the Gold Creek floodplain was mined for gravel, which resulted in the creation of Gold Creek Pond. The pond strongly influences groundwater flow, effectively pulling water from the Gold Creek spawning reach. This hydrologic influence results in Bull Trout passage issues, mortality, and stranding in disconnected pools within Gold Creek. Past logging in the watershed has likely contributed to the dewatering of Gold Creek as well. Development and implementation of a restoration plan are in process.

- Tributaries to Kachess Reservoir include Box Canyon Creek, Gale Creek, Lodge Creek, Thetis Creek, and the upper Kachess River (Kachess River above the reservoir, otherwise known as the Kachess/Mineral system). The upper Kachess River and Box Canyon Creek are the primary spawning tributaries for Bull Trout above Kachess Reservoir. The upper Kachess River dewaters from mid-summer to early fall each year thereby creating passage and stranding issues for both juvenile and adult Bull Trout. Box Canyon Creek has natural and unnatural fish passage barriers. Peekaboo Falls, a natural barrier in Box Canyon Creek, is 1.6 miles upstream from Kachess Reservoir. Assessment of the habitat above Peekaboo Falls is needed. If habitat is suitable, providing passage above these falls would increase available spawning and rearing habitat. The mouth of Box Canyon Creek completely dewaters in late summer of dry years when irrigation demand peaks, creating a passage barrier for adult Bull Trout attempting to reach spawning habitat. Solutions to this issue are being evaluated. A feasibility study was issued in August 2018, and final designs are being developed. Other issues in this area include stream dewatering across the reservoir bed during low-pool events that creates passage problems for adults, habitat degradation, and fish stranding. Gale and Thetis creeks need to be assessed for fish use and stranding events.
- Tributaries upstream from Cle Elum Reservoir include Cooper and Waptus rivers that flow into Cle Elum River then into Cle Elum Reservoir. The Waptus and Cooper rivers are the most significant tributaries to Cle Elum River, but each has limited access for fish because of natural barrier waterfalls upstream from their confluences with the Cle Elum River. The Cle Elum River has 19 miles of mainstem habitat and numerous tributaries located within the National Forest. Historically, Bull Trout were present. The last observations of Bull Trout occurred in 2002, and redds have not been documented here. However, recent environmental deoxyribonucleic acid (eDNA) studies have resulted in Bull Trout detections in the Cle Elum and Waptus watersheds. Further assessment of Bull Trout presence in this area is warranted.

4.2 Upper Yakima River Tributaries North

This section describes Yakima River tributaries on the northside of the Kittitas Valley below the upper reservoirs (Keechelus, Kachess, and Cle Elum) and above Roza Diversion Dam. Many creeks intersect the KRD canal and could be supplemented through KRD's tributary program. Locations for tributary enhancement measures in this area are shown in Appendix B (Figure 9) and include the following:

- The Cle Elum River below the Cle Elum Reservoir is channelized, highly regulated, and operated for irrigation purposes. The river runs only 8 miles before entering the Yakima River. River operations can cause dewatering of side channels resulting in fish stranding. This reach lacks large woody material (LWM) due to reservoir operations. Habitat restoration projects to improve instream flow and reconnect side channels is underway. The current flow regime limits spawning habitat in the spring and winter. An altered flow regime would improve side channel connectivity, rearing conditions (higher winter flows), and outmigration conditions (spring pulse flows).

- The Teanaway River once supported Bull Trout and large runs of spring Chinook and Coho salmon. It is also a critical tributary for steelhead production. Past logging and grazing practices severely degraded this watershed, resulting in channelization and floodplain disconnection. Floodplain function has been severely compromised by agriculture, residential development, and over-appropriation of water. Water uses include diversions for seasonal irrigation, stock water, and domestic water supply. These practices resulted in higher than normal water temperatures not supportive of native fishes. Presently, non-governmental organizations lease water rights annually in late summer to restore instream flows. Irrigation systems have been modified to reduce diversions and increase streamflow, but instream flows still limit fish access in summer. A significant early accomplishment of the Integrated Plan was the purchase of the 50,241-acre Teanaway Community Forest. The Teanaway Community Forest contains nearly 400 miles of free-flowing streams and prime habitat for fish and wildlife. This purchase demonstrates how conservation, sustainable forestry, and community partnerships can achieve goals that conserve at-risk timberlands and key aquatic habitats. Water conservation, water exchange, floodplain connectivity, channel complexity, grazing management, road management, evaluation of habitat for potential Bull Trout supplementation, habitat restoration, fish passage, and further assessments are needed to continue progress on Teanaway River watershed restoration.
- Swauk Creek is an important spawning and rearing stream for steelhead, spring Chinook and Coho salmon, and Pacific Lamprey. Historical mining, roadbuilding, and channel alterations have degraded the habitat. There are many diversions on Swauk Creek and its tributaries, which may cause the creek to have very low, or intermittent flow in some reaches. Road realignment and floodplain connectivity should be examined. Assessments of water conservation or exchange are needed. Fish passage and habitat improvements are needed in addition to the current enhancement projects.
- Reecer Creek flows into the Yakima River at river mile (RM) 153.7. Its headwaters flow year-round, however, in late summer, water diversions cause intermittent surface flow in some downstream reaches. Significant agricultural and residential development has occurred in the watershed, and many fish passage barriers exist. The Mid-Columbia Fisheries Enhancement Group, Yakama Nation, YTAHP, and the City of Ellensburg have conducted habitat restoration in the downstream reaches. Potential exists for water conservation, water exchange, fish passage, and habitat restoration.
- Wilson Creek has a drainage area of 408 square miles and flows into the Yakima River at RM 147. The Wilson Creek drainage area includes much of the Kittitas Valley agricultural area. Access to the watershed for migratory fishes, such as steelhead, is limited to the lower few miles of the stream near Ellensburg. Fish passage barriers are present throughout the watershed in and upstream from the city. KCCD, in partnership with YTAHP, is currently removing fish barriers in this drainage. Some stream reaches may become dewatered, while others have high flows during the irrigation season. Branches of Wilson Creek flow underground through Ellensburg via numerous culverts. Whiskey and Mercer creeks are branches of the

Wilson Creek system; Whiskey Creek is under assessment for flow enhancement through the KRD's supplementation program as an alternative route for passage to the Naneum Creek watershed.

- Naneum Creek, a tributary to Wilson Creek, has significant habitat potential for steelhead as it flows 17.0 miles through a forested area to Haney Meadows. There are no natural barriers in the upper watershed, but it is inaccessible to fish as there are many fish passage barriers in the Kittitas Valley. Naneum Creek joins Wilson Creek shortly after leaving the canyon but separates before it is managed for irrigation delivery. Assessments for fish passage barriers, water conservation, water exchange, fish passage, and habitat enhancement are recommended.

- Cherry Creek watershed includes Coleman, Cooke, Parke, and Caribou creeks in the eastern part of the Kittitas Valley. These streams have been developed and managed as irrigation conveyances; they converge and drain into Wilson Creek near the confluence with the Yakima River. Assessments for fish passage, habitat suitability, restoration of instream flows, and habitat restoration are needed.

4.3 Upper Yakima River Tributaries South

These streams intersect the KRD canal, and their streamflow can be supplemented through KRD's tributary program via the KRD canal system, where desired. Water conservation projects implemented on the KRD canal would enhance flow both in timing and volume. Sites for tributary enhancement measures in this area are shown in Appendix B (Figure 10) and include the following:

- Tucker, Tillman, and Spex Arth creeks are small tributaries south of the Yakima River near Cle Elum. These creeks have important fish habitat near the confluences with the Yakima River and some limited headwater habitats. For example, Spex Arth Creek has a watershed area of 3.3 square miles. These streams have potential for water conservation, water exchange, fish passage, and habitat enhancement.

- Big and Little creeks are medium-size watersheds near Easton with rearing and headwater habitat. These streams become disconnected from the Yakima River by water diversions and impassable barriers. Some of which have been addressed in recent years. Habitat potential in the upper watersheds is, reportedly, in good condition, but further assessments and subsequent actions for habitat restoration including land acquisition, water exchange, conservation, and fish passage are needed.

- Taneum Creek enters the Yakima River at RM 166.1, and Manastash Creeks enters at RM 154.5. Both creeks have been focal points for restoration over the past few decades. All significant fish passage barriers have been removed in both creeks. These creeks are important for salmon and steelhead spawning and rearing. Water exchange, water conservation, and habitat restoration projects and assessments are needed.

4.4 Middle Yakima River Tributaries

The middle Yakima River tributaries cover a vast geographic area from the Wenas Creek drainage in the north through the entire Naches River watershed, with headwaters at Chinook Pass to Ahtanum Creek in the south (Appendix B, Figure 11). This area includes Bumping and Rimrock reservoirs. Irrigation development in the middle and lower drainages leaves varying degrees of habitat access and suitability. The potential for water conservation and exchange projects exists in some areas, which would require assessments. The Naches River is formed by the confluence of Bumping and Little Naches rivers. Bumping Reservoir has minimal effect on flow in the Naches River resulting in approximately 28 miles of somewhat unregulated river. Tieton Dam on the mainstem Tieton River forms Rimrock Reservoir. Flows from Tieton Dam are heavily regulated to accommodate reduced flows in the upper basin in late summer to support spawning and rearing Chinook salmon. Both reservoirs are among the five major Reclamation regulated reservoirs in the Yakima Project and the Integrated Plan. Locations of tributary enhancement measures in this area are shown in Appendix B (Figure 11) and include the following:

- The American River, upper Naches River, Bumping River below the reservoir, and the Little Naches River watershed are in forested areas. These rivers were once significant fish production tributaries and need to be assessed for potential habitat improvement projects for Bull Trout, steelhead, Coho, and spring Chinook salmon. Recreation and forestry are the primary land uses in these watersheds.
- Deep Creek above Bumping Reservoir is an important Bull Trout spawning and rearing area. In drought years, the creek dewaters upstream from the Forest Service Road 1800 Bridge, creating potential passage and stranding issues. During reservoir drawdown, the mouth of Deep Creek becomes a system of braided channels that may create a fish passage barrier for Bull Trout. During drought, the braided channels go subsurface resulting in a loss of connection between the reservoir and Deep Creek. In both instances, conditions prevent Bull Trout from moving into upstream spawning grounds. In addition, Bumping Dam lacks fish passage thereby isolating Bull Trout above the dam from other populations.
- Rattlesnake Creek enters the Naches River at RM 27.8 and has a drainage area of 134 square miles. Bull Trout spawn in the headwaters located in a designated wilderness area. In addition, Rattlesnake Creek supports both steelhead and spring Chinook. Nearby Nile Creek supports steelhead and salmon as well. Habitat restoration and water conservation actions are needed.
- The North Fork Tieton River, Indian Creek, and the South Fork Tieton River are tributaries to Rimrock Reservoir, which have significant populations of Bull Trout. Tieton Dam lacks fish passage, but the reservoir supports a significant population of Kokanee, a forage fish for Bull Trout. A fish passage assessment is underway for the South Fork Tieton River to address a manmade waterfall that becomes a barrier when the reservoir is drawn down. The alluvial fan of Indian Creek varies annually and, in some years, may create a fish passage barrier. Indian Creek is monitored annually for fish passage conditions. Clear Creek Dam, upstream from Rimrock Reservoir,

impounds the North Fork Tieton River and Clear Creek. Functional fish passage for Bull Trout at this dam is needed.

- The Tieton River below Tieton Dam flows 21.3 miles through a confined canyon to its confluence with the Naches River at RM 17.5. The river is heavily regulated for irrigation resulting in extreme flow regimes. Opportunities to enhance rearing habitat exist under the current flows, but improvements would be bolstered by an altered flow regime. Water diversion improvements are needed to reduce juvenile mortality.
- Cowiche Creek enters the lower Naches River at RM 2.7. It has a drainage area of 120 square miles. The City of Yakima and the County of Yakima are currently undertaking a joint fish passage and habitat improvement project at the mouth of Cowiche Creek. The South Fork Cowiche and tributaries as well as mainstem reaches of Cowiche Creek have suitable habitat for steelhead and Coho salmon. Conservation projects have improved instream flows in North Fork of Cowiche Creek but instream flows, fish passage, and habitat restoration are still needed.
- The lower Naches River suffered dewatering for several decades from operation of the Wapatox Powerplant located 7.4 miles upstream from the river's confluence with the Yakima River. Streamflow was improved significantly when Reclamation purchased the powerplant and ceased operations. Water exchange, conservation, fish passage, habitat enhancement, and habitat assessments are needed. Potential exists for water conservation and exchange projects on the Naches-Selah, Wapatox, and Gleed irrigation canals to further enhance lower Naches River streamflow. The City of Yakima and Yakima County are working together to replace Nelson Dam with a roughened channel, consolidate four irrigation diversions, enhance adjacent flood plain habitat, and improve fish passage for salmonids and Pacific Lamprey. Presently, Nelson Dam's fish passage facilities require extensive annual maintenance.
- Wenas Creek enters the Yakima River near RM 122.4. This creek was privately developed for irrigation in 1912 when a dam was built at creek-mile 14.7, creating a barrier to upstream passage for migratory fishes. Lower Wenas Creek may support a small run of steelhead. Irrigation diversions resulting in low flows and minimal, functional riparian habitat are limiting-factors below the reservoir. Wenas Creek upstream from the reservoir is suitable steelhead habitat (approximately 25 miles) and flows through State and Federal lands. Fish passage, diversion screens, habitat restoration, water conservation, and exchange assessments are needed.
- Ahtanum Creek has a drainage area of 181 square miles and enters the Yakima River at RM 106.9. Ahtanum Creek is composed of a North Fork, South Fork, and Middle Fork. A small resident population of Bull Trout spawns in Ahtanum Creek, and the creek also supports steelhead, salmon, and Pacific Lamprey to a limited extent. The Ahtanum Irrigation District (AID) and Wapato Irrigation Project (WIP) operate major irrigation diversions on the creek. AID is unable to divert surface water from Ahtanum Creek after July 10, when most AID irrigators switch to groundwater wells. Floodplain disconnection and development for agricultural and residential uses has substantially degraded habitat in the lower Ahtanum watershed. Habitat restoration, water supply and related water conservation and exchange issues, fish passage, and Bull Trout occupancy require further assessments.

4.5 Lower Yakima River Tributaries

Tributaries flowing into the lower Yakima River are shown in Appendix B (Figure 12). These streams originate and flow through the Yakama Nation Reservation. Areas for tributary enhancement measures include the following:

- Satus Creek has a drainage area of 625 square miles, approximately 10 percent of the Yakima River basin area (YBFWRB, 2009). It flows into the Yakima River at RM 69.6. Streamflow in Satus Creek is currently unregulated. Since 1991, irrigation diversions have been shut down to protect instream flows. Satus Creek is one of the primary steelhead-producing streams in the Yakima River basin, supporting 25 to 50 percent of the annual steelhead run in the Yakima River basin. The lower end of Satus Creek was realigned to the south for agriculture; therefore, an assessment to realign the creek to its original channel is needed. Floodplain protection is also needed.
- Toppenish Creek has a drainage area of 612 square miles and flows into the Yakima River at RM 80.4 (YBFWRB, 2009). The creek is an important producer of MCR steelhead. Lower Toppenish Creek meanders across a broad floodplain and wetland complex. The lower creek has been profoundly influenced by private and public irrigation development, diversions, check-dams, return-flow drains, and other water management features. Upper Toppenish Creek has a largely unregulated flow regime, which enhances opportunities for continued protection and restoration. The creek also flows through Toppenish National Wildlife Refuge (TNWR) for 3.09 miles, which presents opportunities for increased coordination between TNWR and Yakama Nation to improve floodplain restoration and management. The draft Toppenish Creek Corridor Enhancement Plan authorized under Section 1204(c) of Title XII includes projects designed to reduce irrigation influence on the creek and restore channels, floodplains, and native vegetation. Recent evidence suggests that juvenile steelhead survival in Toppenish Creek and its side channels is low. Further assessment is underway.

Chapter 5. Conclusion

Tributary enhancement is an important tool for recovering MCR steelhead and Bull Trout in the Yakima River basin; these species are currently ESA-listed as threatened. Although successful tributary enhancement projects have been completed in Taneum, Manastash, Cowiche, and many other creeks within the basin, significant opportunities remain to improve both fisheries resources and water supply efficiencies for agricultural resources in the tributaries of the Yakima River basin. Additional instream flows, stream and riparian enhancement, passage, and floodplain improvements continue to be necessary for full restoration of ESA-listed species in the Yakima River basin.

Tributary enhancement projects primarily benefit spawning and rearing habitat for ESA-listed MCR steelhead and Bull Trout and ultimately aid in their recovery. Other benefits include the following:

- For agriculture, tributary enhancement projects will provide water users with increased efficiency in using their water allotment and facilitate conversion from gravity irrigation to pressurized sprinkler irrigation.
- For irrigation entities, these projects would help reduce maintenance costs by replacing open canals with buried pipeline, reduce seepage losses, and provide overall better water management. Screening of existing water diversions will also reduce maintenance costs by eliminating potential fish entrainment into irrigation systems.
- For fish and aquatic life, these projects will provide a reliable and higher base of instream flow in tributaries and improve extent and duration of flow in seasonally dewatered reaches. This improves the ability of anadromous and resident fish populations to rear and migrate as well as improves the quantity, quality, and diversity of other aquatic life (insects, riparian vegetation). Native fishes such as steelhead, Coho salmon, Bull Trout, Pacific Lamprey, and spring Chinook salmon will have access to miles of spawning and rearing habitat that was previously unavailable due to barriers or dewatering.

Implementation of tributary enhancement projects will be contingent upon participation and agreement of appropriate, tributary water-right owners. Reclamation will prioritize projects according to hydrologic, environmental, engineering, and economic factors. Impacts of these actions on affected water users will also be evaluated. During project development, Reclamation will review and evaluate alternatives as well as seek consensus among stakeholders and water users on actions selected for implementation. By addressing key issues in the Yakima River tributaries, the projects and actions discussed in this investigation report will contribute to the recovery of ESA-listed species in the Yakima River basin and improve efficiencies in water management.

In summary, tributary enhancement provides major benefits to both agriculture and fisheries resources and demonstrates how basin stakeholders can work together to achieve these benefits; therefore, Reclamation submits this programmatic tributary investigation report to the U.S. Senate Committee on Energy and Natural Resources and the U.S. House of Representatives Committee on Natural Resources as required by Section 1207(e) of Title XII before any funds can be appropriated. Reclamation is also submitting this report to the Governor of the State of Washington and making it available to the public in compliance with Title XII Section 1207.

Based on the benefits of the tributary program and the increased collaboration to support and implement enhancement projects in the basin, Reclamation will continue to work with the Yakama Nation, USFWS, NMFS, Ecology, WDFW, YTAHP, irrigation districts, and water users to implement advantageous tributary enhancement projects throughout the Yakima River basin.

Chapter 6. References

References Cited	Description
64 FR 14517	*Federal Register*. 1999. 50 CFR Part 223. Threatened Status for Two ESUs of Steelhead in Washington and Oregon. Vol. 64, No. 57, March 25, 1999. Rules and Regulation. pp. 14517-14528.
70 FR 52630	*Federal Register*. 2005. 50 CFR Part 226. Designation of Critical Habitat for 12 ESI of West Coast Salmon and Steelhead in Washington, Oregon, and Idaho, Final Rule. Vol. 70, No.170, Sept. 2, 2005, Rules and Regulations, pp. 52630-52858.
71 FR 834	*Federal Register*. 2006. 50 CFR Parts 223 and 224. Final listing determinations for 10 Distinct Population Segments of West Coast Steelhead; final rule. Vol. 71 No. 3, January 5, 2006. Rules and Regulations, pp. 834-862.
Haring 2001	Haring, D. 2001. *Habitat Limiting Factors: Yakima River Watershed, Water Resource Inventory Area*s 37-39. https://www.digitalarchives.wa.gov/do/5A57F716B64BB3A59B9C7EB5274642CA.pdf
HDR et al. 2012	HDR Engineering, Inc., Anchor QEA, ECONorthwest. 2012. *Natural Resources Economics.* Prepared for Reclamation and Ecology for the Yakima River Basin Integrated Water Resource Management Plan
Herrera and Watershed 2013	Herrera Environmental Consultants, Inc. and Watershed Science & Engineering, Inc. 2013. *Manastash Creek Corridor Habitat Enhancement and Flood Hazard Reduction Plan*. Prepared for Kittitas County Conservation District. June 12, 2013. https://www.kccd.net/ManastashReach/12-05295-000%20Manastash%20Creek%20Corridor%20Plan%202013%2006%2012.pdf
Jacobs 2017	Jacobs Engineering Group. 2017. *Naneum, Wilson, and Cherry Creek Watershed Assessment.* Prepared for Kittitas County Flood Control Zone District, Ellensburg, Washington. https://www.co.kittitas.wa.us/public-works/flood/naneum-wilson-cherry-creek-watershed-assesment.aspx
KRD 1999	Kittitas Reclamation District. 1999. *Kittitas Reclamation District Conservation Plan.* http://www.krdistrict.org/
McCormick and Conley 2017	McCormick, J. and Alex Conley. 2017. *Yakima Basin Fish Passage Barrier Synthesis.* Yakima Basin Fish and Wildlife Recovery Board. Yakima, Washington. http://www.ybfwrb.org/Assets/Documents/2016_FishPassageReport.pdf
Monk 2009	Monk, P.A. 2009. *Taneum Creek Study: The Bruton-KRD Water Exchange Project*. Prepared by U.S. Fish and Wildlife Service, Yakima, Washington. https://www.usbr.gov/pn/programs/yrbwep/phase2/taneumcreek/taneumcreek study-final.pdf
Monk 2017	Monk, P.A. 2017. *Taneum Creek Steelhead Migration Review.* U.S. Fish and Wildlife Service Technical Report. Yakima, WA. https://www.fws.gov/LeavenworthFisheriesComplex/MidColumbiaFWCO/pdf/2015%20Monk%20Taneum_Tech_Rep_Jan_14_2015_FINAL.pdf
NMFS 2009	National Marine Fisheries Service. 2009. *Middle Columbia River Steelhead Recovery Plan.* NOAA Fisheries Northwest Region. November 30, 2009. https://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/middle_columbia/mid-c-plan.pdf
Reclamation 1999	Bureau of Reclamation. 1999. *Yakima River Basin Water Enhancement Project Final Programmatic Environmental Impact Statement January 1999* *https://www.usbr.gov/pn/programs/yrbwep/reports/1999peis.pdf*

References Cited	Description
Reclamation 2011	Bureau of Reclamation. 2011. *Yakima River Basin Study: KRD Canal Modifications Technical Memorandum*. Anchor QEA. https://www.usbr.gov/pn/programs/yrbwep/reports/tm/4-4krdmod.pdf
Reclamation and Ecology 2012	Bureau of Reclamation and Washington State Department of Ecology. 2012. *Yakima River Basin Water Resources Management Plan Final Programmatic Environmental Impact Statement*. Pacific Northwest Region, Columbia-Cascades Area Office, Yakima, Washington. March 2012. https://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html
Reclamation 2013	Bureau of Reclamation. 2013. *Yakima River Basin Water Enhancement Project: Tributary Enhancement Program: Manastash Creek Investigation Report.* Prepared for U.S. Senate Committee on Energy and Natural Resources, U.S. House of Representatives Committee on Natural Resources.
Reclamation 2014	Bureau of Reclamation. 2014. *Bull Trout Enchantment Report.* Prepared for the Yakima River Basin Water Enhancement Project and Integrated Plan. Richard Visser, Columbia-Cascades Area Office, Yakima, WA
Reiss et al. 2012	Reiss, K.Y., Thomas, J., Anderson, E., and Cummins, J. 2012. *Yakima Bull Trout Action Plan.* http://www.ybfwrb.org/recovery-planning/bull-trout- recovery-planning/bull-trout-action-plan/
Roni et al. 2002	Roni, P., Beechie, T. J., Bilby, R.E., Leonetti, F.E., Pollock, M.M., and Pess, G.R. 2002. A Review of Stream Restoration Techniques and a Hierarchical Strategy for Prioritizing Restoration in Pacific Northwest Watersheds. *North American Journal of Fish Management* 22:1-20
Stanford et al. 2002	Stanford, J.A., Snyder, E.B., Lorang, M.N., Whited, D.C., Matson, P. L., and Chaffin, J.L. 2002. *The Reaches Project: Ecological and Geomorphic Studies Supporting Normative Flows in the Yakima River Basin, Washington*. Final Report to the Bureau of Reclamation, Yakima, Washington.
WSDA 2018	Washington State Department of Agriculture Website. 2018. *Agriculture – A Cornerstone of Washington's Economy*. Email pio@agr.wa.gov or call 360- 902-1813. https://agr.wa.gov/aginwa/
YBFWRB 2009	Yakima Basin Fish & Wildlife Recovery Board. 2009. *Yakima Steelhead Recovery Plan.* Yakima, Washington. http://www.ybfwrb.org/Assets/Documents/Plans/YakimaSteelheadPlan.pdf
YBFWRB 2017	Yakima Basin Fish & Wildlife Recovery Board. 2017. *Yakima Bull Trout Action Plan: 2017 Action Update*. Yakima, WA. http://www.ybfwrb.org/recovery-planning/bull-trout-recovery-planning/bull- trout-action-plan/
YSPB 2004	Yakima Subbasin Fish and Wildlife Planning Board. 2004. *Final Draft of the Yakima Subbasin Plan*. May 28, 2004. Prepared for the Northwest Power and Conservation Council. http://www.ybfwrb.org/Assets/Documents/Plans/YakimaSubbasinPlan.pdf
YTAHP 2017	Yakima Tributary Access and Habitat Program, Washington Resource Conservation and Development Council, funding Bonneville Power Administration. 2017. *Yakima Tributary Access & Habitat Program: Strategic Plan.* Yakima, Washington. https://docs.wixstatic.com/ugd/a17495_88b382478ce5455a94b4e70039f7c2ac.pdf

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Appendix A – Letters of Support

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Kittitas County Conservation District
2211 W. Dolarway Rd, Suite 4 - Ellensburg, WA 98926
Phone (509) 925-3352 - Fax (888) 546-0825

October 28, 2018

Dawn Wiedmeier
Area Manager Columbia-Cascades Area Office
1917 Marsh Road
Yakima, WA 98901

Subject: Yakima Basinwide Tributaries Programmatic Investigation Report

Dear Ms. Wiedmeier:

I am writing to convey the Kittitas County Conservation District's support for the Bureau of Reclamation's (Reclamation) Yakima Basinwide Tributaries Programmatic Investigation Report. Stakeholders across the basin, including irrigators, local governments, natural resource agencies, and the Yakama Nation, are working together to improve conditions, water supplies, and habitat conditions. Completion of the Yakima Basinwide Tributaries Programmatic Investigation Report will help Reclamation and its partners more effectively pursue these goals.

From our perspective as a small local government entity working primarily with private landowners and water users, the involvement and leadership displayed by Reclamation provides a game changing opportunity to contribute to the recovery of salmonid species in the Yakima River basin and to support agriculture. We worked with the Manastash Creek Steering Committee on the Manastash Creek Restoration Project for many years to address fish screening and fish passage needs, as well as stream flow enhancements. While we were able to complete much of the agreed upon plan, it wasn't until Reclamation became involved that the major milestones of both removing the last fish passage barrier and achieving year-round stream flow were achieved. These accomplishments would have been impossible without the work of Reclamation staff and the coordination with the Kittitas Reclamation District and all the local partners. Reclamation's technical expertise, authorities and relationships in our communities were and are essential to this and other local successes.

We are pleased to support Yakima Basinwide Tributaries Programmatic Investigation Report and are looking forward to working with Reclamation to replicate the achievements in Manastash Creek in the other tributaries of the Upper Yakima River.

Please let me know if I can provide any further information to support this effort.

Sincerely,

Anna Lael
District Manager

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
304 S. Water Street, Suite 201
Ellensburg, Washington 98926-3617

August 9, 2018

Dawn Wiedmeier
Area Manager
Columbia–Cascades Area Office
1917 Marsh Rd.
Yakima, WA 98901

Subject: Yakima Basinwide Tributaries Programmatic Investigation Report

Dear Ms. Wiedmeier:

I am writing to convey my support for the Bureau of Reclamation's (Reclamation) Yakima Basinwide Tributaries Programmatic Investigation Report. Stakeholders across the basin, including irrigators, local governments, natural resource agencies, and the Yakama Nation, are working together to improve conditions, water supplies, and habitat conditions. Completion of the Yakima Basinwide Tributaries Programmatic Investigation Report will help Reclamation and its partners more effectively pursue these goals.

The Yakima River Basin Water Enhancement Project has enabled Reclamation to participate in some notable successes in the Manastash and Taneum Creek tributaries. The subject report will help guide and enable efforts in other tributaries. Reclamation is uniquely positioned to lead specific project types due to its combination of technical expertise, authorities, and relationships in the community.

Please let me know if I can provide any further information to support this effort.

Sincerely,

Dale Bambrick, Chief
Columbia Basin Branch
NOAA Fisheries, West Coast Region

cc: Wendy Christensen, GChristensen@usbr.gov

August 25, 2018

Dawn Weidmeyer
Area manager
Columbia-Cascade Area Office
U.S. Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901-2058

Dear Dawn,

Trout Unlimited is pleased to provide our support for the priorities identified in the Draft Report titled, *Yakima Basin Tributaries Programmatic Investigation Report.* This report summarizes the goals and future actions of the Bureau of Reclamation and its partners as part of the Yakima River Basin Water Enhancement Project (YRBWEP) in the Yakima Basin in Washington State to enhance water supply for the Yakima Basin Community, fish and wildlife and their habitats.

The priority tributaries identified in this report are critical for recovery of anadromous fish, including ESA listed Mid-Columbia steelhead and Bull Trout. Many fish runs have been significantly reduced or extirpated from many of the tributaries in the Yakima Basin by over-appropriation of water supplies, changing climates, irrigation withdrawals, lack of screening, etc. In addition, habitat and natural stream channel processes have been substantially changed by human interaction and flooding. The Bureau of Reclamation through YRBWEP, is critical to leading efforts to reconnect tributaries throughout the area and enhance productive habitat to recover salmon and steelhead and water supplies for agriculture remain sustainable.

Trout Unlimited looks forward to continuing our partnership with the Bureau of Reclamation and other basin partners to take advantage of significant opportunities to improve both water supply for fisheries and efficiencies for water supply for agriculture users. We value our partnership not only through YRBWEP but also the Yakima Basin Implementation Program.

Sincerely,

Lisa Pelly
Director, Trout Unlimited Washington Water Project

Washington Water Project
103 Palouse, Suite 14, Wenatchee, WA 98801 and 115 S. Glover Street, Twisp, WA 98856
(509) 888-0970 • Fax: (509) 888-4352 • www.tu.org

United States Department of Interior
Fish and Wildlife Service
Mid-Columbia Fish and Wildlife Conservation Office
7501 Icicle Road
Leavenworth, WA 98826
Phone (509) 548-7573
FAX (509) 548-5743

August 20, 2018

MEMORANDUM

To: Area Manager, Bureau of Reclamation, Columbia-Cascades Area Office
Yakima, Washington

From: Project Leader

Re: U.S. Fish and Wildlife Service Support for the draft Yakima Basinwide Tributaries Programmatic Investigation Report

The U.S. Fish and Wildlife Service (Service) appreciates the opportunity to submit this memorandum in support of Reclamations draft Yakima Basinwide Tributaries Programmatic Investigation Report and the actions identified therein.

The draft report identifies potential tributary enhancement projects that are designed to both improve aquatic habitats and enhance water supplies for the agriculture community. Such mutually beneficial goals and results are critical to continued success in the Yakima River basin. Completed actions such as the Taneaum and Manastash creek tributary enhancements and the Cowiche Creek Water Exchange are excellent examples of such win-win projects. We eagerly anticipate implementation of the actions proposed for tributaries above the Keechelus, Kachess, and Cle Elum reservoirs for the obvious and potential benefit of Bull trout populations.

The Service looks forward to continuing to work with the Bureau of Reclamation and all of the partners to continue the cooperative and collaborative progress made to date.

cc:
USFWS, Wenatchee, (J. Krupka)
USFWS, Portland, OR (D. Nehler)

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
South Central Region • Region 3 • 1701 South 24th Avenue, Yakima, WA 98902-5720
Telephone: (509) 575-2740 • Fax: (509) 575-2474

Wendy Christensen, YRBWEP Manager
US Bureau of Reclamation
Columbia-Cascades Area Office
1917 Marsh Road
Yakima, WA 98901

October 18, 2018

Dear Ms. Christensen,

The Washington Department of Fish and Wildlife (WDFW) wholeheartedly supports the Bureau of Reclamation's Yakima Basinwide Tributaries Programmatic Investigation Report (Report) that was released on August 01, 2018. We also appreciate the opportunity to provide written comments on the draft Report, which were submitted on August 30, 2018.

The Report identifies important projects to provide effective and efficient means to increase instream flows for fish in Yakima Basin tributaries. It also describes potential efficiency gains in irrigation water use, potential improvements in operational flexibility for agricultural water users, and areas of enhancement that would assist in the recovery of ESA-listed Middle-Columbia River steelhead and bull trout throughout the Yakima Basin. WDFW has a vested interest in projects that enhance water supply, improve habitat conditions, and benefit resident and anadromous fish, especially federally listed species, in Yakima River tributaries.

We are excited that the Bureau is interested in expanding on the great work already accomplished in Manastash and Taneum Creeks to other tributaries. Please consider WDFW a supportive and enthusiastic partner in implementing the projects identified in the Report.

Sincerely,

Mike Livingston
Regional Director, South Central Region
Washington Department of Fish and Wildlife

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
South Central Region • Region 3 • 1701 South 24th Avenue, Yakima, WA 98902-5720
Telephone: (509) 575-2740 • Fax: (509) 575-2474

October 24, 2018

Dawn Weidmeier
Area Manager
Columbia-Cascade Area Office
U.S. Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901-2058

Re: Yakima Basin Integrated Plan Habitat Subcommittee Letter of Support for the draft Yakima Basinwide Tributaries Programmatic Investigation Report

Dear Ms. Weidmeier,

The Habitat Subcommittee of the Yakima Basin Integrated Plan (Integrated Plan) supports the Bureau of Reclamation's (BOR) Tributary Report and the BOR's commitment to supporting the goals of the Integrated Plan throughout the entire basin. Tributary enhancement projects are critical for achieving the Integrated Plan's fisheries recovery goals. Bull Trout and steelhead are particularly dependent on tributary habitat. The tributaries above BOR storage reservoirs have been an emerging priority for restoring Bull Trout populations and providing salmon and steelhead habitat where fish passage has been established. Effectiveness in these reservoir tributaries is particularly critical alongside water storage projects at these same reservoirs.

The Manastash and Taneum Creek tributaries have already seen success through Yakima River Basin Water Enhancement Project efforts, and the tributary report will help facilitate future similar efforts. Having BOR as a partner in protecting and restoring tributary habitats is critical to the success of the Integrated Plan. We want to thank the BOR for this proactive step to expand its geographic footprint for fisheries work to match that of the Integrated Plan.
Sincerely,

Jeff Tayer

Jeff Tayer, Chair of the Habitat Subcommittee, on behalf of the Habitat Subcommittee
Washington Department of Fish and Wildlife

YAKIMA BASIN
FISH AND WILDLIFE
RECOVERY BOARD

TO: Gwendolyn Christensen. YRBWEP Manager. Bureau of Reclamation Columbia-Cascades Office

DATE: October 2, 2018

TOPIC: Support for Yakima Basinwide Tributaries Programmatic Investigation Report

I write to express the support of the Yakima Basin Fish and Wildlife Recovery Board for the Bureau of Reclamation's Yakima River Basin Water Enhancement Project (YRBWEP) Yakima Basinwide Tributaries Programmatic Investigation Report.

The Yakima Basin Fish and Wildlife Recovery Board was created by 21 county and city governments and the Yakama Nation to promote the recovery of at-risk fish and wildlife species in the Yakima Basin. The Board worked with local partners to develop the 2009 Yakima Steelhead Recovery Plan, which NOAA Fisheries adopted as part of the federal Endangered Species Act required recovery plan for Mid-Columbia Steelhead. The Board also led development of the Yakima Bull Trout Action Plan, and, as the designated SRFB Lead Entity for the Yakima Basin, runs an annual review of proposals for grants from the State's Salmon Recovery Funding Board (SRFB).

The technical and financial support from YRBWEP that completion of the Yakima Basinwide Tributaries Programmatic Investigation Report enables will greatly accelerate the rate of habitat project implementation in priority tributaries in the Yakima Basin. Full implementation of the actions identified in this report will significantly improve the viability of steelhead in the Yakima Basin and help achieve levels that would allow for delisting of the Mid-Columbia Steelhead DPS.

We are excited to work together with Reclamation staff and other habitat restoration partners to implement the actions identified in this Tributaries Report. For many watersheds, the report calls for detailed evaluation and assessment to identify specific projects for on-the-ground implementation. We look forward to working in close partnership with Reclamation, existing project sponsors, the Yakama Nation, and WDFW to complete detailed tributary-specific assessments that capture and build on existing knowledge in an efficient manner. We believe that these assessments can meet the YRBWEP Program's needs at the same time that they inform pending updates of the Yakima Steelhead Recovery Plan, the Yakima Bull Trout Action Plan, and the Yakima Basin Integrated Plan's Habitat Strategy.

Thank you for the opportunity to review and express our support for the Yakima Basinwide Tributaries Programmatic Investigation Report.

Sincerely,

Adam Fyall
Chairman

1200 Chesterly Drive, Suite 280, Yakima, WA 98902
Phone (509) 453-4104 Email: info@ybfwrb.org Web: www.ybfwrb.org

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

October 9, 2018

Wendy Christensen

Columbia-Cascades Area Office
1917 Marsh Road
Yakima, WA 98901-2058

Dear Wendy,

I am writing in support of the Yakima Basinwide Tributaries Programmatic Investigation report. The Yakama Nation Department of Natural Resources appreciates the need for a programmatic approach to implementing the tributary section of YRBWEP. There is good work to be done on many Yakima Basin tributaries, and doing an individual study on each tributary has limited the opportunities to implement tributary enhancement. Opportunities to fund and carry out tributary work often arise quickly given funding cycles, staff availability, and chances to collaborate on projects not funded by YRBWEP. We hope the draft programmatic tributary investigation will help getting more good projects on the ground faster. We support the Yakima Basinwide Tributaries Programmatic Investigation report.

We suggest certain edits to the report. Comments and suggested changes to the draft are copied below my signature.

Sincerely,

Phil Rigdon, Superintendent

Yakama Nation Department of Natural Resources

The report should emphasize that the projects listed in it are not an exhaustive list. Additional concepts will certainly be fleshed out as knowledge grows and work proceeds. The report should state that these are "for example" or "including but not limited to", so as to avoid the need to submit additional tributary reports, which is the purpose of the report.

Executive Summary

This programmatic tributary investigation report meets the requirements of Section 1207 of Public Law 103-

Page 1

The Yakima River and tributaries historically supported culturally and economically significant salmonid runs of Sockeye (*Oncorhynchus nerka*), steelhead (*O. mykiss*), Coho (*O. kisutch*) and Chinook (*O. tshawytscha*). In addition to anadromous fishes, the headwaters of Yakima River tributaries supported healthy populations of fluvial and adfluvial Bull Trout (*Salvelinus confluentus*). Of these, Sockeye, Coho, and summer run Chinook salmon were extirpated from the basin (and are currently being reintroduced), and both Middle Columbia River (MCR) steelhead and Bull Trout

Page 4

Remove quotation marks and add text.

specifically provided in Section 1204 (a)(3) for action on the Yakama Reservation. Reclamation operates the Yakima Project according to the United States' Yakama Treaty obligations, delivering the Yakama Nation's "time immemorial" priority date water right for fish and other aquatic life according to court orders. This is the senior water right in the basin and, while technically unquantified, was defined by an order of the Superior Court of Washington (July 17, 1990) as the "specific minimum instream flow necessary to maintain anadromous fish life in the Yakima River." It was later extended to specifically include all tributaries that support fish availability at the Yakama Nation's usual and accustomed fishing locations (i.e., the entire Yakima River basin).

Page 11

Chapter 3. Connection to Various Plans and Studies

Reclamation works with stakeholders and natural resource managers within the basin to enhance flows for fish and ensure the reliability of the water supply for out-of-stream uses. Reclamation's actions for tributary enhancement are connected to various plans and studies developed by project partners, water users, and resource managers within the Yakima River basin. Some of these plans are listed below. This is not an exhaustive list. Other plans and assessments exist through the efforts such as Subbasin Planning and the Yakima Basin Fish and Wildlife Recovery Board and may be used in developing specific tributary projects.

Page 16

Water exchange symbol identifies tributaries where water may be conveyed through canal facilities to improve streamflows for fish. Water exchange projects may also improve water supplies for irrigation and may include drilling groundwater wells or ~~injecting water into the ground~~inducing recharge to groundwater for later withdrawal.

Table 1. Tributary area descriptions discussed in this section (see Figure 2)

Page 17

4.1 Tributaries Above Upper Reservoirs

This section describes tributaries in the upper Yakima River basin that flow into Keechelus, Kachess, and Cle Elum Reservoirs (Figure 8). These reservoirs were natural lakes prior to dam construction and lack fish passage structures. Restoration of fish passage at all five reservoirs plus Clear Lake is one component of the YBIP. Table 2 identifies YRBWEP enhancement measures and opportunities for this area. Possible project locations within this area include the following:

Page 18

- Tributaries to Kachess Reservoir include Box Canyon Creek, Gale Creek, Thetis Creek, Lodge Creek, and the upper Kachess River (Kachess River above the reservoir, otherwise known as the Kachess/Mineral system). The upper Kachess River and Box Canyon Creek are the primary spawning tributaries for Bull Trout above Kachess Reservoir. The upper Kachess River dewaters from mid-summer to early fall each year thereby creating passage issues for both juvenile and adult Bull Trout. Box Canyon Creek has natural and unnatural fish passage barriers. Peekaboo Falls is a natural barrier

Comments on Satus and Toppenish Creek sections.

1. The map needs to show Yakama Reservation boundaries.

2. The map should demarcate the Toppenish and Satus basins rather than combining them into one area.

3. Remove "KRD main canal" from map legend.

4. Make irrigation system channels a different color than natural streams on the map.

5. Throughout, the symbols are confusing and not helpful. We suggest you delete the symbols and just make little tables for each creek or at a minimum include a text label beneath each symbol.

6. We suggest you separate land protection from habitat restoration as a separate category of action. These actions often occur independently and can use different mechanisms, especially within the Reservation.

7. The Toppenish Creek Corridor Plan has separate authorization is not dependent on the Tributary Section that is the focus of this report.

Satus Creek –changes in red.

Satus Creek has a drainage area of 625 square miles, approximately 10 percent of the

Yakima River basin area (YBFWRB, 2009). It flows into the Yakima River at RM 69.6. Streamflow in Satus Creek is currently unregulated. Since 1991, irrigation diversions have been shut down to protect instream flows. Satus Creek supports from ¼ to ½ of the annual steelhead run in the Yakima River basin.

YRBWEP is funding the Yakama Nation to evaluate a pump exchange project on lower Satus Creek. This project would benefit irrigation and enhance flows in the mainstem Yakima River.

This pump exchange project may not belong in the Satus Creek section given how little influence the project will have on lower Satus Creek and the fact of it being covered under another section of YRBWEP.

Important steelhead producing stream. Needs habitat restoration, water conservation, and exchange projects to reduce WIP influence on lower creek and improve water quality.

- Water conservation may not be a good fit here given that the creek has no diversions, and flow is augmented by irrigation return flow in the lower 8.4 miles.
- The lower 16 miles of Satus Creek have been re-aligned to the south by agriculture, there is a need for increased floodplain land protection and an assessment of the potential to re-occupy the original, more northerly, channel alignment.
- Again, it is not clear what the pump exchange will look like or how it will change the WIP interaction with lower Satus Creek.
- Satus Creek basin has a large rangeland expanse, ephemeral and seasonal tribs may be very important to cold water plumes in the Satus main channel. So watershed-based restoration and resilience measures to climate change will be important.

Toppenish Creek

Toppenish Creek has a drainage area of 612 square miles and flows into the Yakima

River at RM 80.4 (YBFWRB, 2009). The creek is an important producer of Middle Columbia River steelhead. Lower Toppenish Creek meanders across a broad floodplain and wetland complex. The lower creek has been profoundly influenced by private and public irrigation development, diversions, check-dams, return-flow drains, and other features to manage water. Toppenish Creek has a largely unregulated flow regime, which enhances opportunities for continued protection and restoration.

The creek also flows through Toppenish National Wildlife Refuge (3.09 square miles) which presents opportunities for flood plain restoration and enhancement within the refuge boundary. We would prefer that it says: … which presents opportunities for increased alignment/coordination by the Refuge with Yakama Nation resource management objectives and approaches for floodplain restoration and management. This would provide cohesive, integrated management for the lower creek.

The draft Toppenish Creek Corridor Enhancement Plan, authorized under Section 1204(c) of Title XII, includes projects designed to reduce irrigation influence on the creek and restore channels, floodplains, and native vegetation. Recent evidence suggests that juvenile steelhead survival in Snake Creek, a side channel of Toppenish creek, is low in comparison to Toppenish Creek. Further assessment is underway. Our understanding is that survival is low throughout all of Toppenish Creek downstream Unit 2. We don't believe the problem has been isolated to Snake Creek, except for a relatively small fraction of the mortality that occurs in the Refuge portion of Snake Creek.

Important steelhead producing stream. Needs habitat restoration, water conservation and exchange projects to reduce WIP influence on lower creek and improve water quality. Assessment for fish passage and survival in Snake Creek, Toppenish National Wildlife Refuge, and elsewhere.

- water conservation is not the highest priority in this part of Toppenish Creek, it has highly augmented summer flow downstream of the Simcoe confluence. Rather water quality, particularly temperature regimes, seem to be a big problem.
- An assessment of the influence of Marion Drain on floodplain water table and associated wetlands is needed.
- "Exchange" is vague-what is needed is to separate the WIP infrastructure from the natural stream and floodplain.
- The potential problem is predation by pike minnows on smolts in lower Toppenish Creek needs to be further studied.

YAKIMA BASIN JOINT BOARD
A Partnership of Public Entities Promoting
the Multiple Uses of the Yakima Valley's
Water Supply

IRRIGATION ENTITIES
KENNEWICK IRRIGATION DISTRICT
KITTITAS RECLAMATION DISTRICT
ROZA IRRIGATION DISTRICT
SUNNYSIDE DIVISION
YAKIMA-TIETON IRRIGATION DISTRICT

MUNICIPALITIES
CITY OF YAKIMA

October 26, 2018

Dawn Wiedmeier
Area Manager
Columbia-Cascade Area Office
1917 Marsh Road
Yakima, WA 98901

Dear Ms. Wiedmeier:

The Yakima Basin Joint Board of Irrigation Districts is in full support of Reclamation's Yakima Basin-wide Tributaries Programmatic Investigation Report. The Yakima Basin Joint Board of Irrigation Districts recognize and fully supports the work which Reclamation and its partners have accomplished to date in the tributaries under the YRBWEP tributary section.

There are numerous opportunities throughout the Yakima Basin to improve conditions in the tributaries and the programmatic report approach is the most efficient course to continue to work with your partners to achieve the goals of YRBWEP and the Integrated Plan.

The Yakima Basin Joint Board acknowledges the need to improve the conditions in the tributaries for the benefit of the threatened Mid-Columbia steelhead and Bull Trout. We believe the Programmatic Report will allow Reclamation to continue to take advantage of partnerships and funding opportunities in a timely manner. Reclamation through the YRBWEP, the IP and its partners is in a position to lead the Yakima Basin in the recovery of the Mid-Columbia steelhead populations and the Yakima Basin-wide Tributaries Programmatic Investigation Report is the right approach to take.

The Yakima Basin Joint Board looks forward to working with Reclamation and its partners to continue to support and collaborate with the YRBWEP and the IP.

Sincerely,

Scott Revell
President

Kittitas Reclamation District

P.O. Box 276
Ellensburg, WA 98926
Phone: (509) 925-6158 Fax: (509) 925-7425

November 6, 2018

Dawn Wiedmeier
Area Manager
Columbia-Cascade Area Office
Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901

Subject: Yakima Basinwide Tributaries Programmatic Investigation Report

Dear Ms Wiedmeier:

Kittitas Reclamation District (KRD) fully supports Reclamation's Yakima Basinwide Programmatic Investigation Report. The KRD, through our Tributary Supplementation Program, is committed to improving conditions of the tributaries as KRD infrastructure allows. We appreciate Reclamation as our partner in this very important program. We also recognize the importance of the Programmatic Report in continuing our work in these tributaries.
The Programmatic Report will enable Reclamation to continue to work in the tributaries of the Yakima Basin with its partners in a timely and efficient manner. The work KRD is doing in the tributaries will play a significant role in the successful de-listing of the Mid-Columbia steelhead and the Programmatic Report allows Reclamation and the KRD to take advantage of the opportunities that arise to improve tributary conditions as rapidly as needed.

The KRD is committed to working with Reclamation and its partners in the Yakima Basin to achieve the goal of de-listing Mid-Columbia steelhead. We believe the Programmatic Report is the correct approach to meet these ends.

The KRD looks forward to working with Reclamation and its partners, continuing and building on the successful cooperation and collaboration established on previous projects.

Sincerely,

Urban Eberhart,
Secretary Manager
Kittitas Reclamation District

ROZA
IRRIGATION DISTRICT

October 26, 2018

Dawn Wiedmeier
Area Manager
Columbia-Cascade Area Office
1917 Marsh Road
Yakima, WA 98901

Dear Ms. Wiedmeier:

The Roza Irrigation District is in full support of Reclamation's Yakima Basin-wide Tributaries Programmatic Investigation Report. The District recognizes and supports the work which Reclamation and its partners have accomplished to date in the tributaries under the YRBWEP tributary section.

Roza acknowledges the need to improve the conditions in the tributaries for the benefit of the threatened Mid-Columbia steelhead and Bull Trout.

Reclamation is in a position to lead the Yakima Basin in the recovery of the Mid-Columbia steelhead populations and Bull Trout and the Yakima Basin-wide Tributaries Programmatic Investigation Report is the right approach to take.

Sincerely,

Scott Revell
District Manager

cc: File

125 South 13th Street • P.O. Box 810 • Sunnyside, Washington 98944
Phone 509-837-5141 • Fax 509-836-4807 • www. roza.org

Appendix B – Recommended Measures, Tables, and Maps

Key to Maps of Tributary Areas

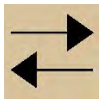
Assessment symbol signifies stream or areas where further studies are needed to address data gaps, identify problems, define solutions, and monitor for dynamic management. Studies may include, but are not limited to fish and wildlife presence, distribution or survival studies, investigations of habitat suitability, or project design and engineering studies.

Fish symbol signifies areas of critical importance to Bull Trout, an ESA-listed fish species that utilizes cold headwater streams within the Yakima River basin for spawning and juvenile rearing. Enhancement actions in these areas for Bull Trout will inherently benefit other native fishes such as steelhead and salmon.

Fish Passage symbol signifies known fish passage problems in Yakima Basin tributaries caused by manmade barriers (e.g. small irrigation diversions), low flows, dewatering of streams, thermal barriers, or unscreened water diversions that entrain and harm juvenile fishes. In the Yakima River Basin, certain reaches of streams become dewatered annually. Dewatering can create fish passage problems or strand fish in isolated pools. Salvaging and translocating fishes are being assessed as a strategy to enhance fish populations, especially Bull Trout.

Habitat Restoration symbol signifies area where habitat protection and restoration are priority actions. Title XII authorized Reclamation to purchase land, water, and to restore stream and floodplain habitat as tributary enhancement measures.

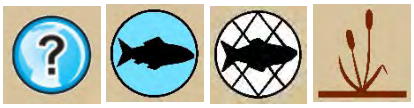
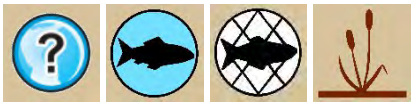
Water symbol signifies areas where water conservation plans identify current and potential projects that are likely to improve the water supply for irrigation and enhance streamflow for habitat improvement.



Water Exchange symbol identifies tributaries where water may be conveyed through canal facilities to improve stream flows for native fishes. Water exchange projects may also improve water supplies for irrigation and may include drilling groundwater wells or inducing recharge to groundwater for later withdrawal.

Recommended Measures for Tributaries Above Upper Reservoirs

See corresponding table and map (Figure 8) following this page.

Recommended Measures for Tributaries Above Upper Reservoirs	Tributary	Assessment/Actions
	Gold Creek	Assessment: Meet with stakeholders to assess implementation options to reduce or eliminate chronic dewatering. Actions: Fish passage, habitat restoration, salvage, translocation, and captive rearing are needed.
	Cold Creek	Assessment: Assess habitat suitability and fish passage solutions.
	Coal and Meadow Creeks	Assessment: Assess habitat suitability and potential restoration actions.
	Kachess River	Assessment: Assess Bull Trout survival and mechanisms to reduce dewatering and disconnection from Kachess Reservoir Actions: Conduct fish rescue, fish translocation, and habitat restoration.
	Box Canyon Creek	Assessment: Assess upstream habitat Actions: Fish rescue, habitat restoration, roughened channel to maintain connectivity to reservoir, and translocation. Creek becomes disconnected from Kachess Reservoir, creating a fish passage barrier. Permanent solution to fish passage is needed to maintain connectivity. Stranding, dewatering, and predation during low flows are also problems that need to be addressed.
	Cooper, Waptus, upper Cle Elum Rivers	Assessment: These major rivers and tributaries supported Bull Trout historically. Efforts are underway to restore salmon to the watershed. Assessments of habitat suitability, and restoration opportunities are needed.

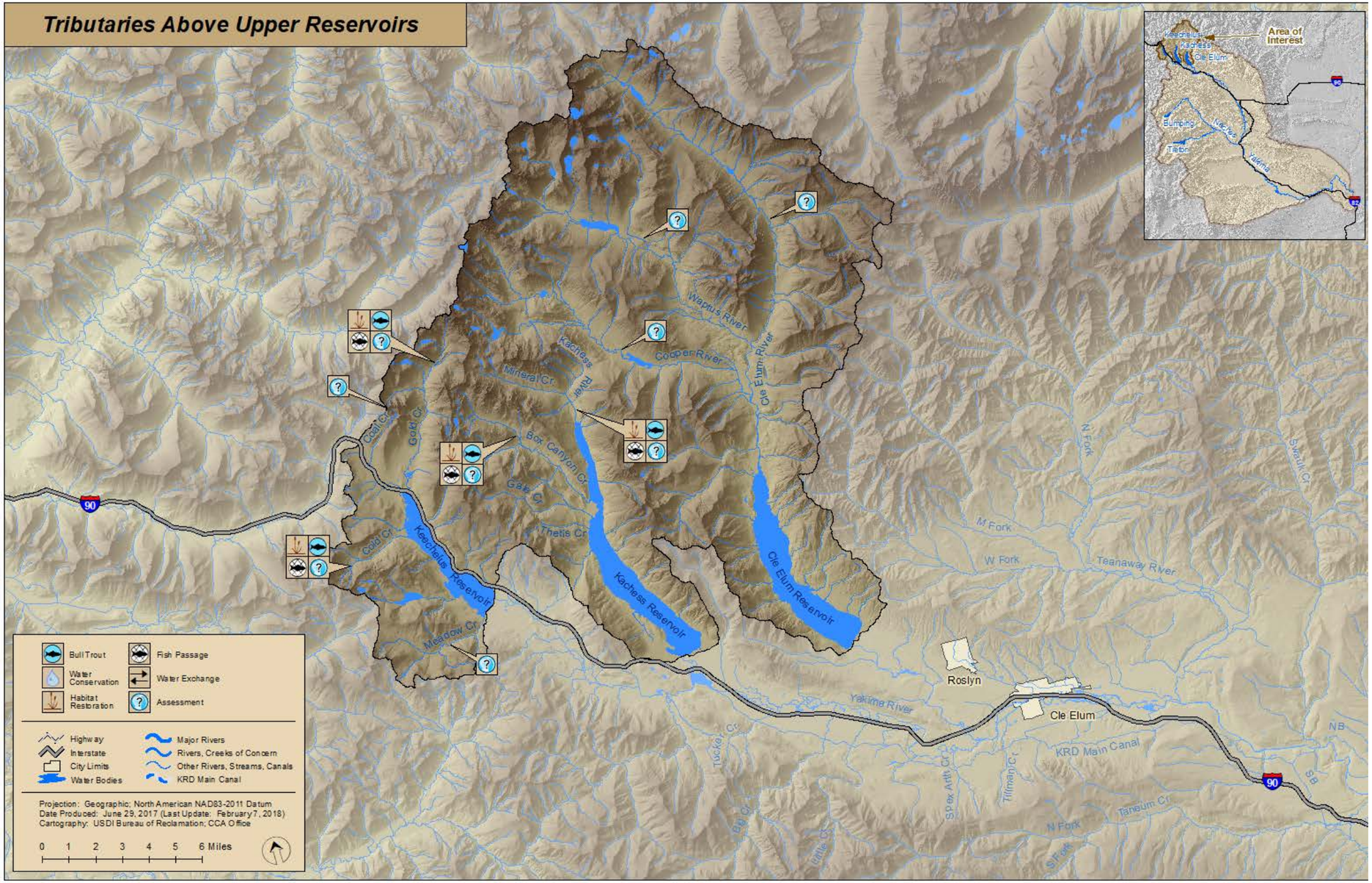


Figure 8. **Tributaries Above Upper Reservoirs** as discussed in Section 4.1. Basinwide tributary enhancement above the Keechelus, Kachess, and Cle Elum Reservoirs

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Recommended Measures for Upper Yakima River Tributaries North

See corresponding table map (Figure 9) following this table.

Recommended Measures for Upper Yakima River Tributaries North	Tributary	Assessments/Actions
	Cle Elum River below the dam	Assessment: Identify locations for woody debris. Actions: Habitat restoration with side channel reconnection. Alter flow regime to mimic natural state.
	Teanaway River	Assessment: Assess locations for potential Bull Trout supplementation Actions: Habitat restoration, fish passage, water conservation, and water exchange projects are needed
	Swauk Creek	Assessment: Assess water conservation and exchange Actions: Provide fish passage, habitat restoration
	Reecer, Wilson, Naneum, Whiskey, Caribou, Cooke, and Cherry creeks complex	Assessment: Assess water conservation and exchange, assess habitat suitability Actions: Improve fish passage, habitat restoration

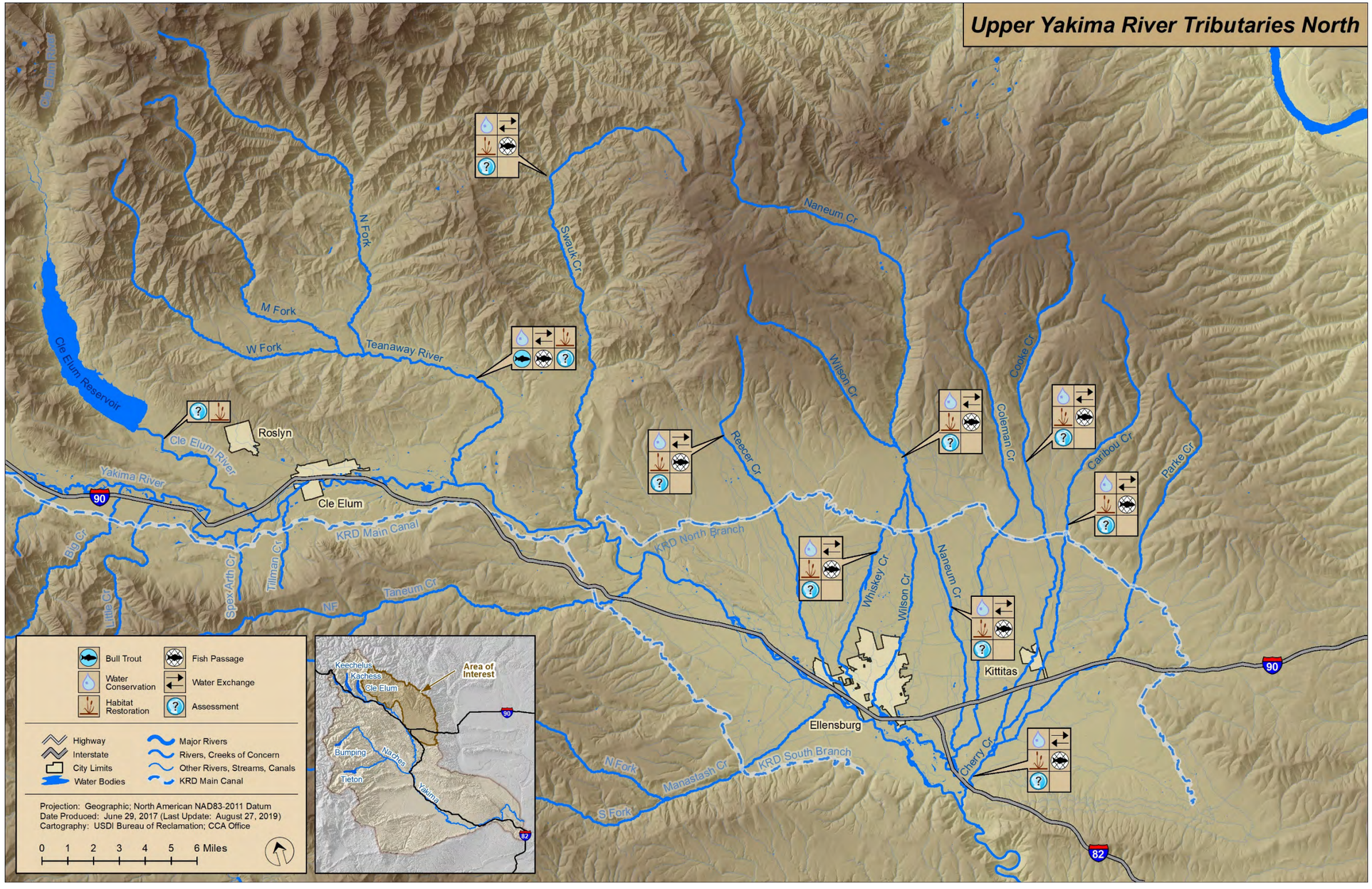

Figure 9. **Upper Yakima River Tributaries North** as discussed in Section 4.2. Basinwide tributary enhancement projects on the north side of the Kittitas Valley that cross the KRD Canal below the reservoirs.

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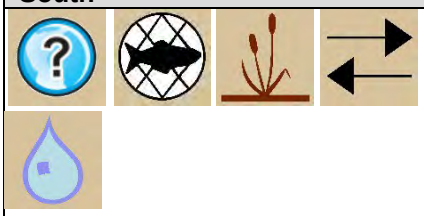
Recommended Measures for Upper Yakima River Tributaries South

See corresponding table and map (Figure 10) following this page.

Recommended Measures for Upper Yakima River Tributaries South	Tributary	Assessment/Actions
	Tucker, Tillman, Spex Arth creeks	Assessment: Assess water exchange, identify restoration and water conservation projects. Actions: Improve fish passage, habitat restoration.
	Big and Little creeks	Assessment: Identify habitat restoration locations, assess passage barriers, assess potential water exchange and conservation actions. Actions: Improve fish passage, habitat restoration, land acquisition.
	Taneum and Manastash creeks	Assessment: Assess habitat restoration actions. Actions: Water exchange/supplementation and conservation, habitat restoration, improve fish passage.

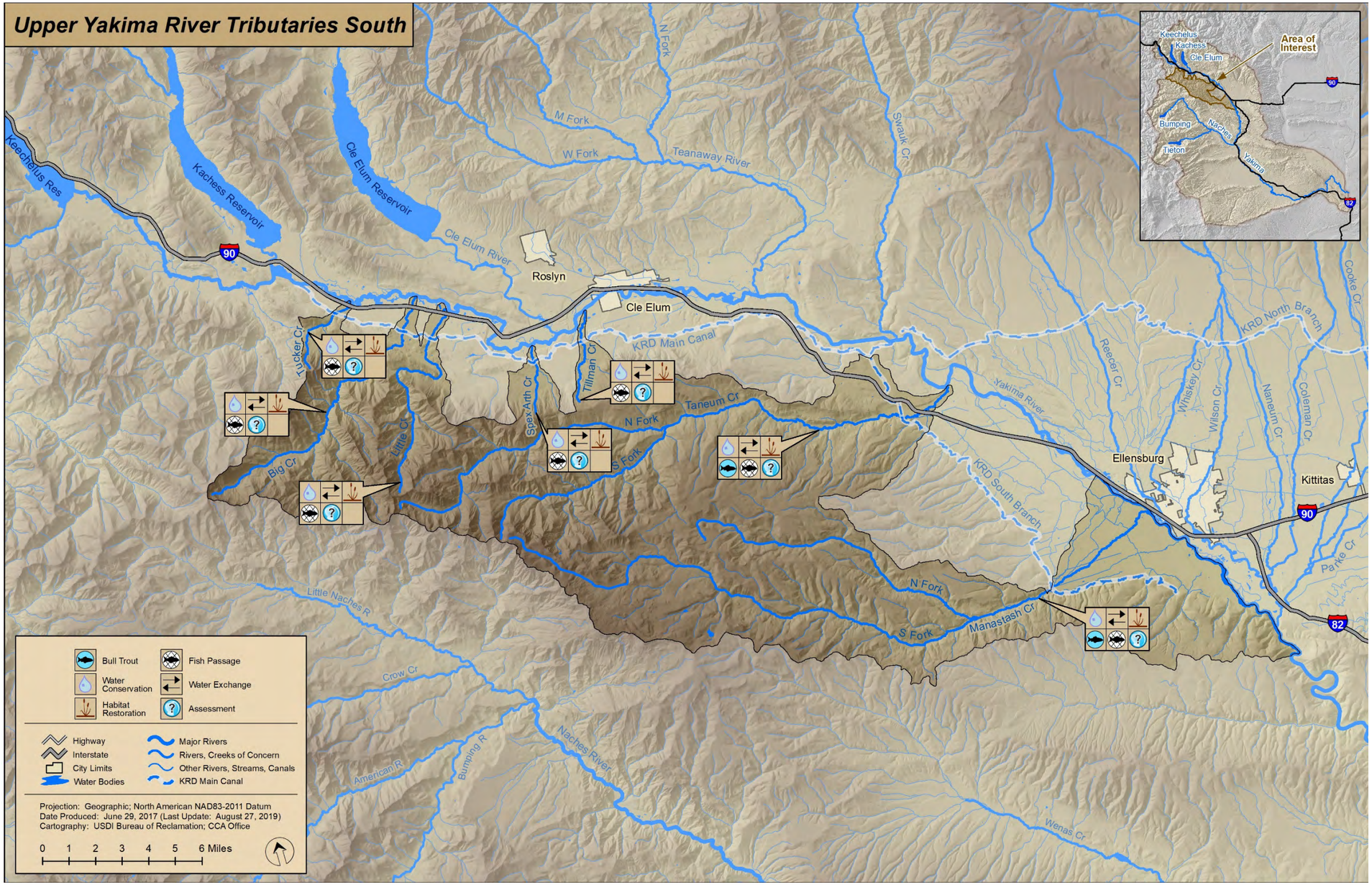


Figure 10. **Upper Yakima River Tributaries South** as discussed in Section 4.3. Tributaries Intersecting KRD Main Canal are south of the Yakima River.

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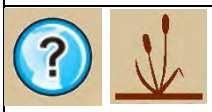
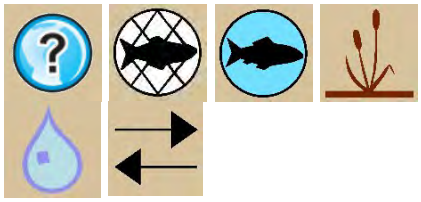
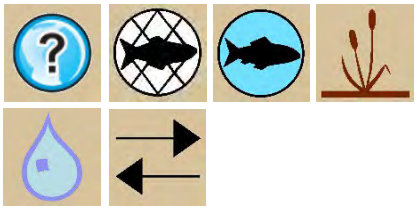
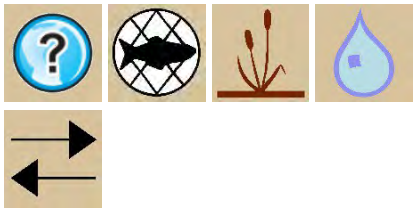
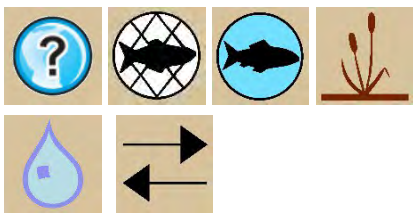
Recommended Measures for Middle Yakima River Tributaries

See corresponding table and map (Figure 11) following this page.

Recommended Measures for Middle Yakima River Tributaries	Tributary	Assessment/Actions
	Upper Naches watershed: American, Little Naches, Bumping rivers	Assessment: Assessed for habitat restoration projects for all native salmonids. Actions: Habitat restoration, improve fish passage.
	Deep Creek	Assessment: Assess dewatering reaches and causes. Actions: Provide fish passage at Bumping Dam and between Deep Creek and reservoir.
	Nile Creek	Assessment: Assess water conservation strategies Actions: Habitat restoration
	Rattlesnake Creek	Assessment: Assess water exchange and conservation projects. Actions: Habitat restoration, improve fish passage, implement conservation actions.
	North and South Fork Tieton rivers, Indian Creek	Assessment: Assess Bull Trout populations for potential as source for translocation in other areas within the basin. Actions: Provide fish passage at Tieton Dam, Clear Creek Dam, and South Fork Tieton. Habitat Restoration. Monitor fish passage at Indian Creek.
	Mainstem Tieton River, Naches River, Cowiche Creek	Assessment: Assess feasibility of habitat restoration in the Tieton River. Actions: Improve water diversions to reduce fish mortality, habitat restoration, water exchange and conservation, and improve fish passage.
	Wenas Creek	Assessment: Assess water supply, conservation, habitat restoration, water exchange projects and their potential. Actions: Evaluate fish passage at the dam and downstream to Yakima River.
	Ahtanum Creek	Assessment: Assess water conservation and water exchange projects to improve flows and water supplies. Presence of Bull Trout needs assessment. Actions: Habitat restoration, fish passage, and floodplain connectivity.

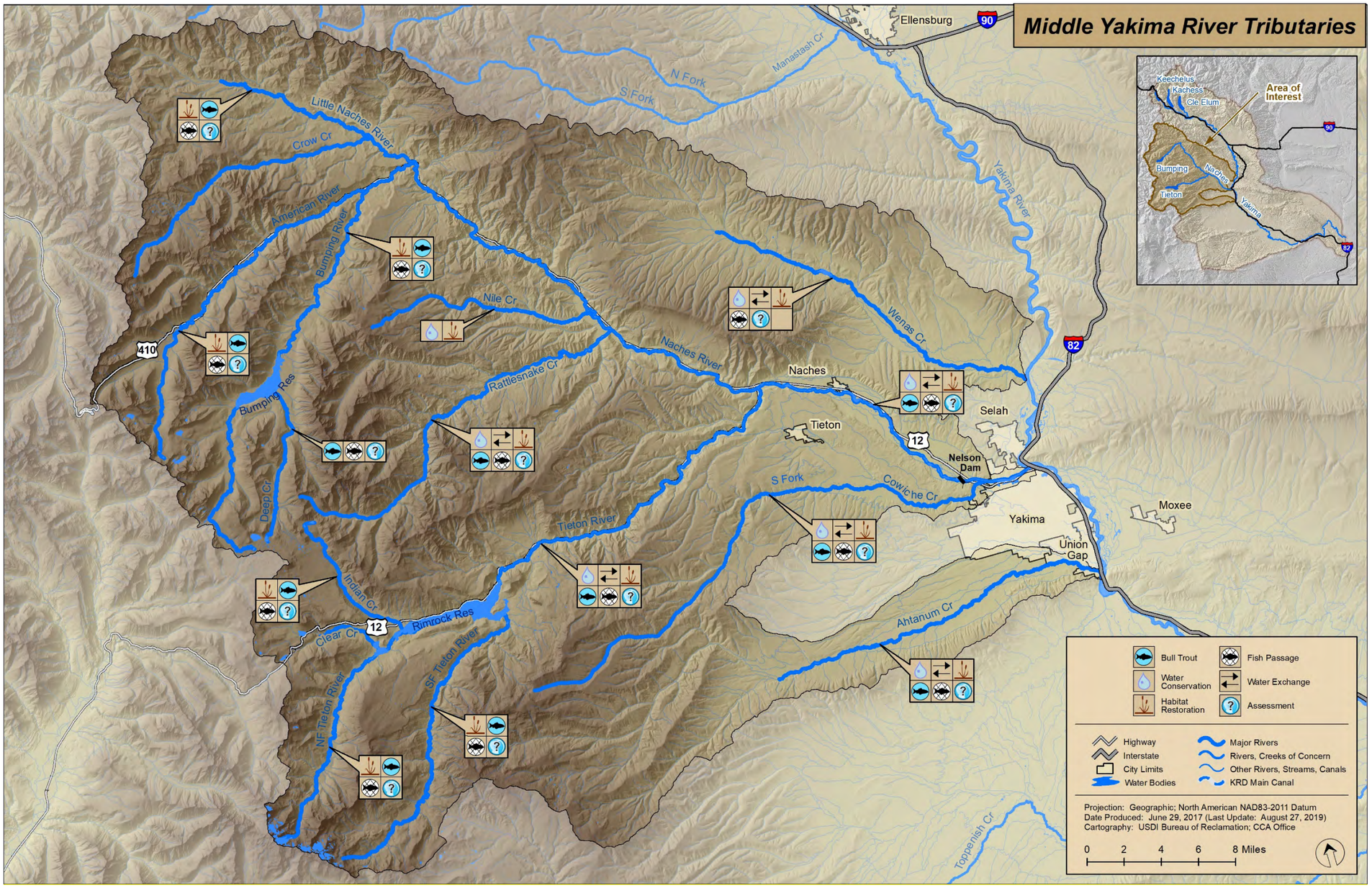


Figure 11. **Middle Yakima River Tributaries** as discussed in Section 4.4. Map shows tributaries flowing into the Naches River above Tieton Dam at Rimrock Reservoir.

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Recommended Measures for Lower Yakima River Tributaries

See corresponding table and map (Figure 12) following this page.

Recommended Measures for Lower Yakima River Tributaries	Tributary	Assessment/Actions
	Satus Creek	Assessment: Assess channel re-alignment. Actions: Habitat restoration and water conservation.
	Toppenish Creek	Assessment: Assess steelhead passage and survival. Assess influence of Marion Drain on water table and wetlands. Actions: Habitat restoration, water quality improvements (temperature).

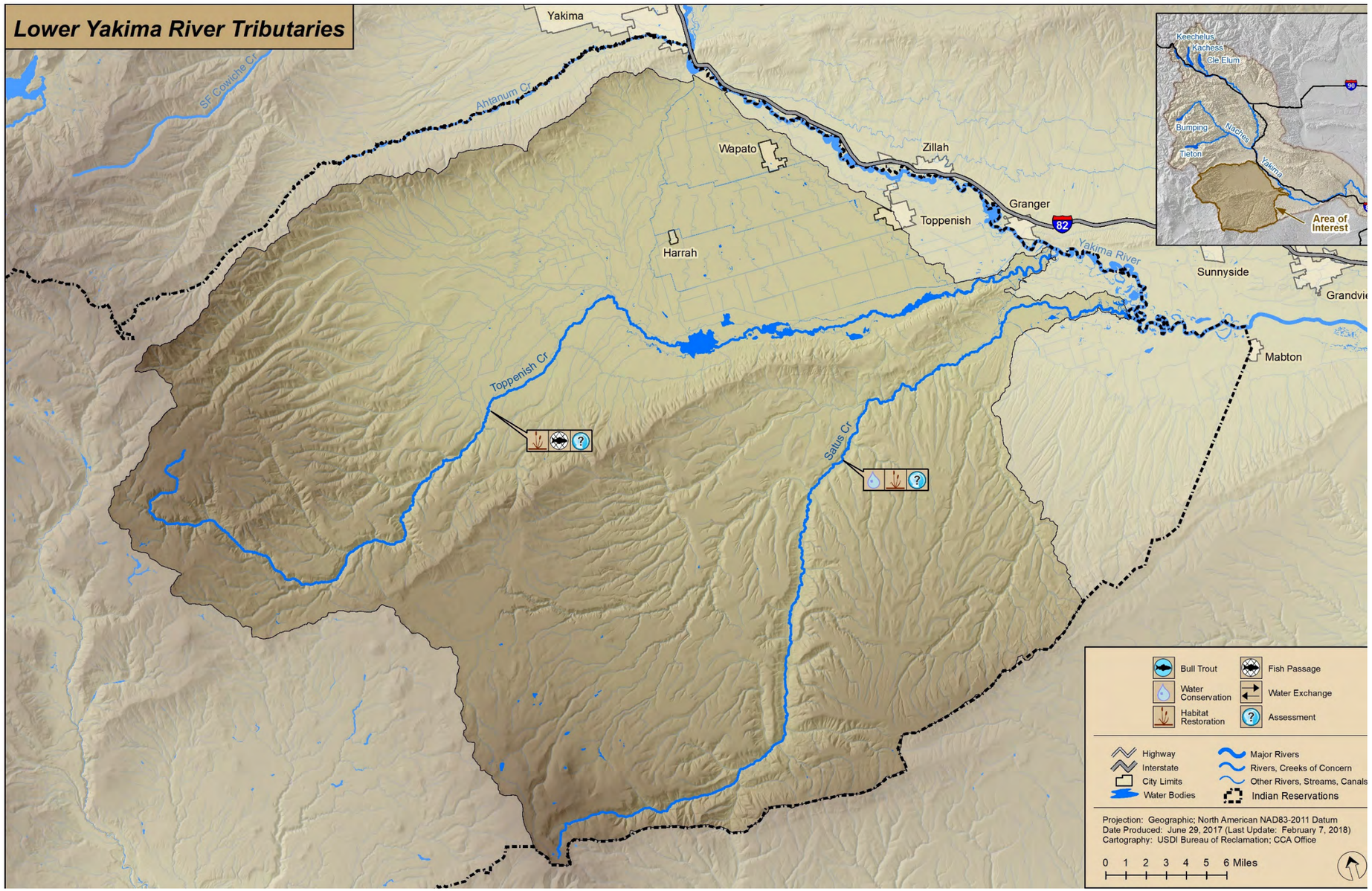

Figure 12. **Lower Yakima River Tributaries** as discussed in Section 4.5. Satus Creek and Toppenish Creek both flow into the lower Yakima River.

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