RECLAMATION
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# DRAFT: Yakima Basinwide Tributaries Programmatic Investigation Report

Yakima River Basin Water Enhancement Project
Pacific Northwest Region

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

**August 2018**

# MISSION STATEMENTS

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**Yakima, Washington**

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# 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 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 |
| YTID | Yakima-Tieton Irrigation District |
| YRBWEP | Yakima River Basin Water Enhancement Project |

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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) and describes measures designed to increase fish abundance and productivity and enhance irrigation reliability throughout the Yakima River basin. The Yakima River basin is located in south central Washington State (Figure 1). The basin supports one of the most productive agricultural areas in the State, and production is valued at more than $4.481 billion dollars (WSDA, 2018). The agriculture industry is reliant on developed irrigation projects that have an impact on native populations of salmon and trout within the basin.


**Figure 1.** Location of the Yakima River basin and its numerous tributaries.

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 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 were highly contested, more so during times of drought. Water shortages and litigation between water users led to mistrust between State, Federal, Tribal, and local entities. This led to the adjudication of surface water rights starting in 1977 and authorization of YRBWEP in 1979 to improve water supply, conserve water, and improve fish passage. Greater emphasis on water conservation, identifying additional storage needs, and tributary enhancement were amended into the legislation that authorized YRBWEP in 1994. In 2009, the Bureau of Reclamation and the Washington State Department of Ecology (Ecology) created a workgroup to facilitate locally driven consensus-based solutions where all stakeholders had input into project development. The combination of mutually beneficial projects developed by this workgroup and concurrently progressing water rights adjudication have relieved much tension among water rights holders in the basin, creating a more cohesive and collaborative atmosphere.

The YRBWEP is tasked with protecting, mitigating, and enhancing fish and wildlife through improved water management, as well as improving reliability of water supply for irrigation (Title XII of Public Law 103-434, October 31, 1994). Reclamation consulted with the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), irrigation districts, and water users to identify tributaries where enhancement would be beneficial to all parties. In addition, Reclamation evaluated existing data and reports including the 1999 *YRBWEP Programmatic Environmental Impact Statement* (PEIS) and the 2012 *Yakima River Basin Integrated Water Resource Management Plan Final PEIS* (Integrated Plan FPEIS) to identify locations of potential enhancement projects.

After thorough evaluation, Reclamation identified tributaries (listed herein) where enhancement actions, when implemented, could achieve the objectives of Title XII and would have major benefits for the agricultural community and fishery resources, including ESA-listed species. The individual actions associated with each tributary project will include outreach to affected water users to gain their participation and agreement, as well as coordination with the WDFW, Yakama Nation, USFWS, NMFS, and others to gain consensus on the best course of action for tributary enhancement.

Prior to appropriation of funds for any proposed tributary enhancement project, a report must be submitted to congressional committees as required by Section 1207(e) of Title XII. The goal of this report is to identify a program of tributary enhancement projects rather than single projects, as has been done previously. Reclamation has determined that this is a more efficient and effective approach to addressing YRBWEP requirements. Specifically, the objectives of this report are to (1) identify effective and efficient means to provide tributaries with increased instream flow for fish, (2) increase efficiency in irrigation water use, (3) improve operational flexibility for agricultural water users throughout the Yakima River basin, and (4) assist in recovery of ESA-listed MCR steelhead and Bull Trout. This report,

developed with input from State, Federal, Tribal, and local entities, is similar to previously submitted reports describing successful YRBWEP enhancement projects, such as Taneum Creek and Manastash Creek, which are discussed herein (see Section 2.1). At the Federal level, this 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. It will also be submitted to the Governor of the State of Washington and made available to the public.

# Chapter 1. Purpose

This investigation report describes potential projects to enhance water supplies and improve habitat conditions in numerous tributaries throughout the Yakima River basin. It was prepared to meet the requirements of Public Law 103-434, Title XII, Section 1207. The intent of the report is to inform the public and the State of Washington about Reclamation's plans to implement priority tributary enhancement projects throughout the basin. Reclamation has determined that preparing a programmatic report to address the basinwide tributary network is the most efficient and effective approach for meeting this requirement. Throughout the process of developing specific tributary projects, Reclamation will provide opportunities for public involvement and participation of water users. Implementation of any 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 determine water management in the Yakima River basin. Congress authorized the United States Reclamation Service (now Bureau of Reclamation) to construction reservoirs and develop irrigation facilities within the Yakima River basin under the Reclamation Act of June 17, 1902. Resulting reservoirs and irrigation projects constitute the Yakima Project. The Yakima Project includes five major storage reservoirs: Keechelus, Kachess, Cle Elum, Bumping, and Rimrock (Figure 2). These reservoirs store and release water to meet irrigation demands, flood control needs, and instream flow requirements for native fishes. Reclamation manages the reservoirs as a system and does not designate any one reservoir or storage space to a specific irrigation district.

Congress first authorized a feasibility study of YRBWEP in 1979, which included analysis of water-supply data. Congress authorized Reclamation to construct fish passage and protective facilities in the Yakima River basin in 1984 when Phase I of YRBWEP was implemented. Phase II of YRBWEP was authorized under Title XII of Public Law 103-434, October 31, 1994 to meet the needs of improved water conservation and management

Title XII specifically 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

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" water right 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).

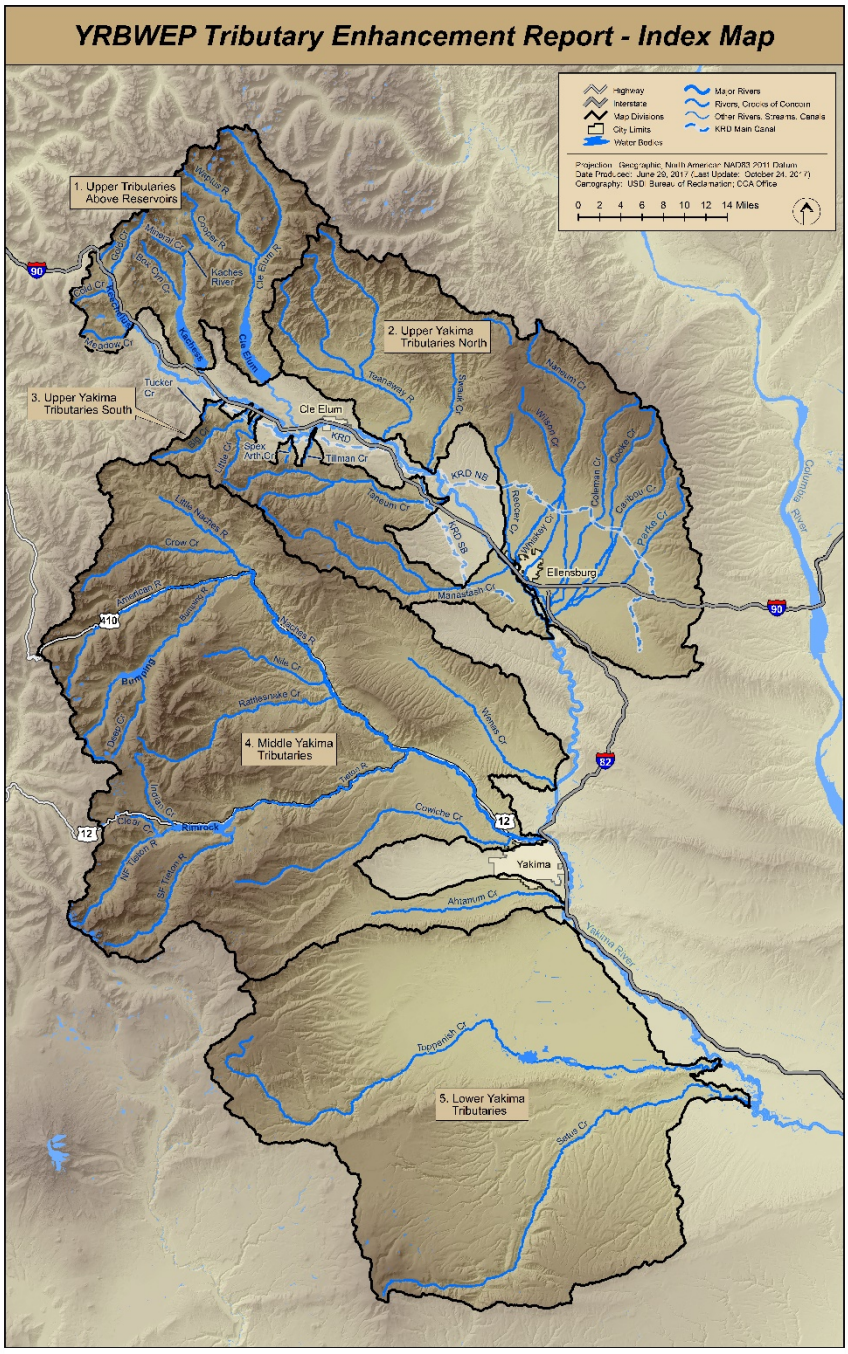



**Figure 2.** Yakima River basin reservoirs and tributary areas: Tributaries Above Upper Reservoirs; Upper Yakima Tributaries North; Upper Yakima Tributaries South; Middle Yakima Tributaries; and Lower Yakima Tributaries.

In June 2012, Reclamation and Ecology released the *Yakima River Basin Integrated Water Resource Management Plan Final PEIS* (Integrated Plan PEIS). This document evaluated previous studies on the Yakima River tributaries and mainstem river-reaches throughout the basin. It was concluded that implementing tributary enhancement actions in the proposed areas would achieve the objectives of Title XII Section 1207 and produce significant benefits for fish (including ESA-listed species) and the agricultural community.

## 2.1 Tributary Enhancement Achievements

In recent years, individual tributary enhancement projects have been completed in conjunction with YRBWEP and the Integrated Plan. The recently completed Taneum Creek and Manastash Creek projects demonstrate the success that can be achieved with the completion of such projects. These projects have opened spawning habitat to an increasing number of steelhead returning to the upper Yakima River basin and will aid in recovery of native fish species (Figure 3). These enhancement successes are exemplary of achieving the authorizations set forth in Title XII, Section 1207.

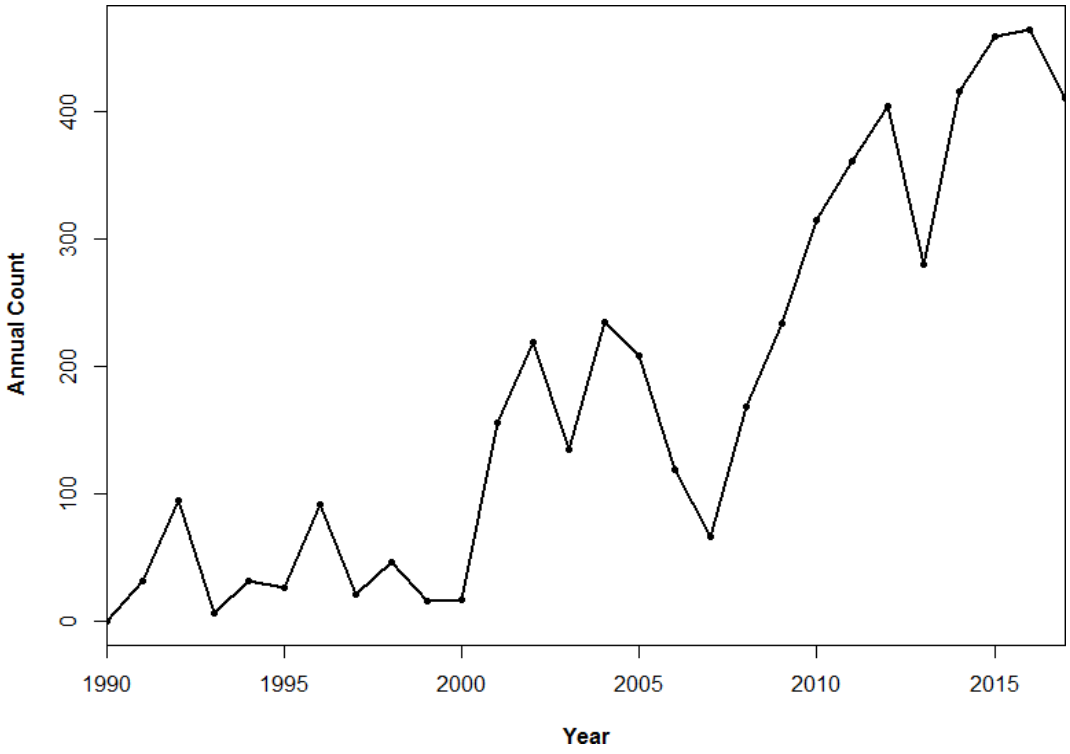



**Figure 3**. Number of adult steelhead migrating upstream past Roza Dam in the Yakima River. Habitat restoration, fish passage, water conservation, and water exchange projects implemented in tributaries (Taneum and Manastash creeks, Teanaway River, and elsewhere) have contributed to improvements in steelhead production.

### 2.1.1 Taneum Creek Tributary Enhancement

The *Taneum Creek Study: Bruton-KRD Water Exchange Project* (Monk, 2009) was developed subsequent to the decisions made in the 1999 PEIS and was the first project implemented as part of Title XII. Reclamation submitted the Taneum Creek study to congressional committees and others as required by Section 1207 in June 2009 for authorization of the project.

Two irrigation structures in Taneum Creek, the Taneum Canal Company (TCC) Diversion and Bruton Dam, prevented salmon and steelhead from accessing high-quality upstream habitat (Figure 4). The TCC Diversion was built in 1910 and created a complete passage barrier for upstream and downstream fish movement, effectively extirpating steelhead and salmon in the watershed. Bruton Dam was constructed in 1965 without fish passage and diverted water was not screened thereby trapping downstream migrants in the canal system. In addition to the passage barriers, water diverted by the TCC Diversion resulted in chronic dewatering of Taneum Creek downstream from the diversion. In addition, the TCC stock water right, when exercised, often dewatered Taneum Creek outside of irrigation season as well. In 1989, Reclamation constructed a fish ladder at Bruton Dam and screened Bruton Ditch to improve fish passage and exclude fish from the Bruton Ditch under the

authority of the Hoover Powerplant Act of 1984 (Hoover Powerplant Act Title I Section 109 of Public Law 98-381, August 17, 1984). However, the fish ladder was functional only during high flows and costly to maintain. Reclamation, Kittitas Conservation Trust (KCT), Kittitas Reclamation District (KRD), and others implemented the Taneum Creek Tributary Enhancement Project in 2009 as authorized under Title XII. KCT received a grant to remove the Bruton Diversion Dam and replace it with a roughened channel (Figure 5). In addition, the TCC Diversion dam upstream from Bruton Diversion Dam was modified with improved passage facilities.

These actions improved fish passage and opened 30 miles of critical habitat to fish, which allowed restoration of steelhead runs (Monk, 2017). In addition, a complementary water exchange project involving Washington Water Trust, Reclamation, and Washington Department of Ecology was implemented to allow the KRD to deliver water to the Bruton Ditch, providing irrigation and stock water to nearby water users. The project partners agreed to drill a well, build a pressurized pipeline, and complete legal agreements to transfer water rights to protect creek water in trust.

At the conclusion of this project, participating water users no longer divert Taneum Creek water for irrigation, because they receive a more reliable water supply through the pressurized pipeline. Since the project was completed in 2011, Taneum Creek is no longer dewatered and fish migrate freely throughout the watershed (Figure 6). The cost of pipeline design and construction was approximately $500,000. Dam removal and roughened channel construction was an additional $450,000.

**Figure 4.** Taneum Creek at Bruton Diversion Dam prior to dam removal. The dam was located 1.6 miles from the mouth of the creek and constructed in the late 1960s without fish passage facilities.

**Figure 5.** Bruton Dam removal in process in 2009.

**Figure 6.** Fish can migrate freely through the roughened channel on Taneum Creek after removal of the 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 these fish, Kittitas County Conservation District (KCCD), Reclamation, the State of Washington (Ecology and Department of Fish and Wildlife), the Yakama Nation, and local irrigators

determined the highest priority for the creek was to address fish passage barriers and the dewatering of the creek.

An investigative report that explored options for enhancing water supply for fish and irrigation in Manastash Creek was developed by Reclamation and partners for submission to congressional committees and others as required by Section 1207(e) of Title XII in March 2013 (Reclamation, 2013). The Manastash Creek Tributary Enhancement project was the first Integrated Plan FPEIS construction project.

The project included replacing an unlined, open-ditch lateral with 3.2 miles of pressurized pipeline in the KRD South Branch Canal. This action conserved an estimated 1,300 acre-feet of water and created the capacity for KRD to deliver water to Manastash Creek, which increased streamflow in the summer by an average of 4 to 5 cubic feet per second. Project partners funded the removal of all fish passage barriers on Manastash Creek (most notably, the Reed Diversion Dam), which was completed in fall 2016. Bull Trout, steelhead, salmon, and lamprey can now access over 20 miles of previously unavailable habitat in the watershed.

## 2.2 Tributary Enhancement in Progress

### 2.2.1 Cowiche Creek Water Exchange Project

The Yakima Basin Fish and Wildlife Recovery Board identified Cowiche Creek as having significant potential for producing steelhead and Coho Salmon (Conley et. al, 2009). However, impassable diversion dams on the creek largely excluded steelhead and other fishes from spawning habitat until recent implementation of passage improvement projects. The watershed was also considerably degraded and disconnected from its floodplain, resulting in annual dewatering in sections of the stream. Reclamation collaborated with the Yakima-Tieton Irrigation District (YTID) and natural resource managers in the area to allow the Cowiche Creek Water Users Association to obtain their water rights from the Tieton River via the YTID diversion. This left Cowiche Creek water instream, eliminated the annual dewatering problem, and facilitated the passage of migratory fishes such as steelhead.

Reclamation and the YRBWEP Workgroup participated by assisting in reviewing legal issues associated with conveying non-Yakima Project water rights through YTID. In addition, Reclamation funded YTID operation and maintenance costs associated with conveying non-project water through their system.

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

The innovative aspect of the Cowiche Creek Water Exchange Project was that funding sources included the Bonneville Power Administration (BPA) and the Washington State Salmon Recovery Funding Board through a grant to North Yakima Conservation District.

### 2.2.2 Toppenish Creek Proposed Tributary Enhancement Project

The Toppenish Creek watershed comprises nearly one-third of the 1.3-million-acre Yakama Nation Reservation land area and 10 percent of the Yakima River basin. Most of the Tribal population lives within the watershed. As such, Toppenish Creek has long been a critical source of natural and cultural resources for the Yakama people; however, it has also 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."

# 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.

- *KRD Water Conservation Plan (KRD, 1999).* KRD is part of Reclamation's Yakima Project. The district provides water to approximately 60,000 acres of farmland. In an effort to conserve water, the KRD completed this plan in 1999. KRD subsequently completed a feasibility investigation which 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 *Yakima River Basin Integrated Water Resource Management Plan Record of Decision.* 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 would eventually save 39,300 acre-feet of water and constructed in phases as funding becomes available. The KRD improvements, beginning with the North Branch Canal lining will play a crucial role in meeting some of the Integrated Plan's Initial Development Phase objectives. KRD has developed and implemented a tributary supplementation project to annually enhance water supplies for tributaries in the the upper Yakima River basin (Figure 7).


**Figure 7.** Tributaries currently enhanced through KRD canal deliveries of conserved water.

- *Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan* (NMFS, 2009). The National Marine Fisheries Service (NMFS) presents detailed empirical data about the status, distribution, characteristics, and life histories of Yakima River basin steelhead. Middle Columbia River (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 in 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, and strategies for their recovery.

- The Yakima River Basin Integrated Water Resource Management Programmatic Final Environmental Impact Statement (Reclamation and Ecology, 2012) and the Yakima River Basin Integrated Water Resource Management Plan Framework for Implementation (HDR et al., 2012). These plans serve as guidance for the Integrated Plan. Reclamation and Ecology recommended further refinements and identified specific tributaries and a number of needed passage and habitat restoration actions.

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

- The *Bull Trout Enhancement* report (Reclamation, 2017) connects the Yakima Bull Trout Action Plan to several tributary enhancement projects as related to the Integrated Plan, and is a framework for improving the resiliency of Bull Trout populations. The *Bull Trout Enhancement* report includes 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 Kittitas County Conservation District (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 in collaborative efforts to document factors limiting 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 each subbasin of the Naneum, Wilson, and Cherry Creek watersheds. The assessment provides a summary of data, describes uses and limitations, and identifies key data gaps. This assessment makes recommendations for (1) projects or actions that should be pursued immediately, (2) ongoing actions that should continue and (3) future actions that need additional planning and study.

- *Yakima Basin Fish Passage Barrier Synthesis* (McCormick and Conley, 2017). The 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 basin agencies.

# Chapter 4. Key Tributaries and Recommended Measures

This section discusses key tributary enhancement measures recommended by stakeholders and resource managers. In this section, Reclamation identifies and discusses the following five watershed areas: Tributaries above Upper Reservoirs (Section 4.1), Upper Yakima Tributaries North (Section 4.2), Upper Yakima Tributaries South (Section 4.3), Middle Yakima Tributaries (Section 4.4) and Lower Yakima Tributaries (Section 4.5). Corresponding maps of each watershed area are in Appendix A and indicate types of projects that may be undertaken.

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 in efforts 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 willingness to participate; therefore, this hierarchy is useful as guidance but often cannot be followed in sequence.

Reclamation defines below the actions needed in each of the five watershed areas by using the following symbols in tables and maps:

**Assessment** symbol signifies streams or areas where further studies are needed to identify problems and define solutions. Studies may include fish and wildlife presence, distribution or survival studies, investigations of habitat suitability, project design and engineering studies. Assessments can include post-project monitoring for adaptive management or study.

**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. This is not intended to exclude salmon and Middle

Columbia River Steelhead from consideration, but both salmon and steelhead occupy or could occupy nearly all accessible tributaries and suitable habitat downstream of the reservoirs. Bull Trout have unique habitat requirements and are of special concern due to impacts of Yakima Project operations and facilities.

**Fish Passage** symbol signifies known fish passage problems caused by manmade barriers, low flows, dewatering of streams, 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 areas where habitat protection and restoration are priority actions. Title XII authorized Reclamation to purchase land, water, and to restore stream habitats as tributary enhancement measures.

**Water** symbol signifies areas where water conservation plans identify 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 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 for later withdrawal.

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

| Tributary Area | Section | Map in Appendix A | Description |
|---|---|---|---|
| Tributaries Above Upper Reservoirs | 4.1 | Figure 8 | Tributaries flowing into Kachess, Keechelus, and Cle Elum reservoirs. |
| Upper Yakima Tributaries North | 4.2 | 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 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 Tributaries | 4.4 | Figure 11 | Tributaries to the Yakima River between Roza Diversion Dam and Sunnyside Diversion Dam. This includes the Naches River watershed, Wenas Creek, and Ahtanum Creek. |
| Lower Yakima 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

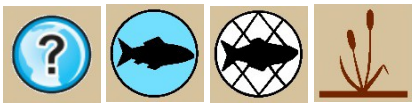
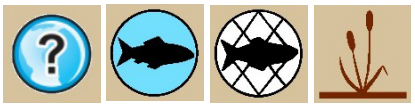
This section describes tributaries in the upper Yakima River basin that flow into Keechelus, Kachess, and Cle Elum Reservoirs (Figure 8). These reservoirs were natural lakes prior to dam construction and lack fish passage structures. Table 2 identifies YRBWEP enhancement measures and opportunities for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

- Tributaries to Keechelus Reservoir include Gold, Cold, Coal, and Meadow Creeks. Gold Creek is the only tributary that currently supports 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, while Coal and Meadow creeks have been altered by road and forest management actions and need further investigation for habitat restoration. Dewatering of Gold 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 strandings in disconnected pools within Gold Creek. Implementation of a solution is needed.

- Tributaries to Kachess Reservoir include Box Canyon Creek, Gale 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 issues for both juvenile and adult Bull Trout. Box Canyon Creek has natural and unnatural fish passage barriers. Peekaboo Falls is a natural barrier in Box Canyon Creek that is 1.6 miles upstream of 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 dry years in late summer when irrigation demand peaks creating a passage barrier to adult Bull Trout attempting to reach spawning habitat. Solutions to this issue are being evaluated. Other issues in this area include stream dewatering across the reservoir bed which creates passage problems for adults, habitat degradation, and fish stranding. Gale and Thetis creeks, which may also be assessed for fish use and salvage potential.

- Tributaries upstream of Cle Elum Reservoir include Cooper and Waptus Rivers which flow into the Cle Elum River which flows into Cle Elum Reservoir. The Waptus and Cooper Rivers are the most significant tributaries to Cle Elum River, but each has limited access for fishes due to natural barrier waterfalls not far upstream from their confluences with the Cle Elum River. The Cle Elum River has 19 miles of mainstem habitat and numerous tributaries located within national forest. Historically, Bull Trout were present. The last observations of Bull Trout occurred in 2002 and redds have not been documented here. New surveys are needed in this area. Construction of fish passage facilities at Cle Elum Dam is underway with expected completion in 2024. Reintroduction of Sockeye in conjunction with interim fish passage solutions is underway.

**Table 2.** YRBWEP enhancement measures for Tributaries Above Upper Reservoirs (see Figure 8**).**

| Recommended measures | Tributary | Problems and needs. |
|---|---|---|
|  | Gold Creek | Implementation of solution to reduce or eliminate chronic dewatering. Fish passage, habitat restoration, salvage, translocation, and captive rearing are needed. |
|  | Cold Creek | Assessment of Bull Trout habitat suitability and fish passage solutions. |
|  | Coal and Meadow Creeks | Further assessment of these watersheds for habitat suitability and restoration actions. |
|  | Kachess River | Becomes disconnected from Kachess Reservoir, creating fish passage barriers. Habitat restoration, fish salvage, translocation, and other actions require further assessment. |
|  | Box Canyon Creek | Becomes disconnected from Kachess Resevoir, creating fish passage barrier. Permanent solution to fish passage is needed to maintain connectivity. Habitat restoration, translocation, and other actions are also needed. |
|  | Cooper, Waptus, upper Cle Elum Rivers | These major rivers and many tributary streams supported Bull Trout historically. Efforts are underway to restore salmon to the watershed and construct fish passage at Cle Elum Dam. Assessments of habitat suitability, fish presence, and restoration opportunities are needed. |

## 4.2 Upper Yakima Tributaries North

This section describes Yakima River tributaries below the upper reservoirs (Keechelus, Kachess, and Cle Elum reservoirs) and above Roza Diversion Dam, which are on the North side of the Kittitas Valley (Federal Register. 2005. 50 CFR Part 226. Designation of critical habitat for 12 Evolutionarily Significant Units of west coast salmon and). Table 3 identifies YRBWEP enhancement measures and opportunities. Possible projects locations within this area include the following:

- The Cle Elum River below Cle Elum Reservoir is channelized, highly regulated, and operated for irrigation purposes. The river is only eight miles in length before entering the Yakima River. River operations can dewater side channels and strand fish. Habitat restoration projects to improve instream flow and re-connect side channels are both underway and needed. In addition an altered flow regime would improve side channel connectivity.

- The Teanaway River channel has been degraded and channelized due to past logging practices (i.e., splash dams). The floodplain functionality 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. Irrigation systems have been modified to reduce diversions and increase streamflow, but low flows can limit fish access in summer. The Teanaway River has sufficient habitat for Bull Trout and spring Chinook. In addition, the river is a critical tributary for steelhead production. One of the most significant early accomplishments of the Yakima Basin 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 and demonstrates how conservation, sustainable forestry, and community partnership goals can be achieved to conserve at-risk timberlands and key aquatic habitats. Water conservation, water exchange, evaluation of habitat for potential Bull Trout supplementation, habitat restoration, fish passage and further assessments are all needed actions to continue progress on Teanaway River watershed restoration.

- Swauk Creek has a drainage area of 100 square miles. Swauk Creek is an important spawning and rearing stream for steelhead, Coho, and Pacific Lamprey. Historical mining, road building, and channel alterations have degraded habitat. There are many irrigation diversions on Swauk Creek and its tributaries, which may cause the creek to have very low or intermittent flow in some reaches. Assessments of water conservation or exchange, fish passage, and habitat improvement are all needed.

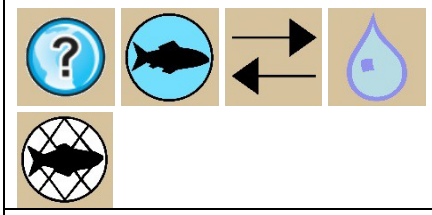
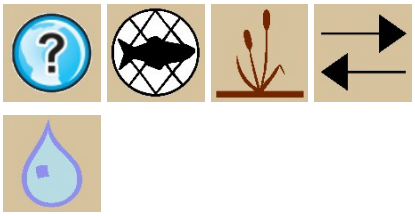
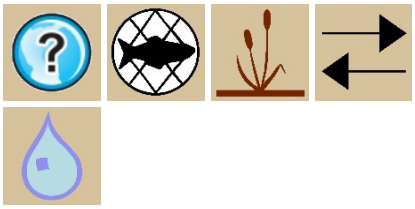
- Reecer Creek flows into the Yakima River at RM 153.7. The headwaters of Reecer Creek flow year-round, but surface flow is intermittent during the late summer in some downstream reaches. Significant agricultural and residential development has occurred in the watershed, and numerous fish passage barriers exist. There is potential for water conservation, 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 fish, 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 of the city. Reaches of the stream may be dewatered, while other sections 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 with Whiskey Creek under assessment for flow enhancement, water conservation, water exchange, fish passage, and habitat potential.

- Naneum Creek, a tributary to Wilson Creek, has significant habitat potential for steelhead in the forested area, where it flows about 17.0 miles to Haney Meadows. There are no natural barriers in the upper watershed, which is not currently accessible because of numerous fish passage barriers in the Kittitas Valley. Naneum Creek converges with Wilson Creek shortly after leaving the canyon, but separates again to be 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, and Caribou creeks, which originate in the eastern part of the Kittitas Valley, flowing into Wilson Creek near the confluence with the Yakima River. All 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, and habitat restoration are needed.

**Table 3.** YRBWEP enhancement measures for Upper Yakima Tributaries North (see Figure 9).

| Recommended measures | Tributary | Problems and needs |
|---|---|---|
|  | Cle Elum River below the dam | Assessment, habitat restoration with side channel reconnection. Alter flow regime to mimic natural state for habitat creation. |
|  | Teanaway River | Assessment of fish passage, habitat, water conservation, and water exchange projects. |
|  | Swauk Creek | Assessment of fish passage, habitat, water conservation, and water exchange projects. |
|  | Reecer Creek, Wilson, Naneum, Cherry creek complex | These tributary streams on the north side of the Kittitas Valley have varying degrees of accessibility for migratory fish.<br>Assessment of fish passage, habitat, water conservation, and water exchange projects. |

## 4.3 Upper Yakima River Tributaries South

The following streams all intersect the KRD Canal, and the streamflow can be supplemented through KRD's tributary program where desired via the KRD canal system. Water conservation projects implemented on the KRD will allow for greater flow enhancement, both

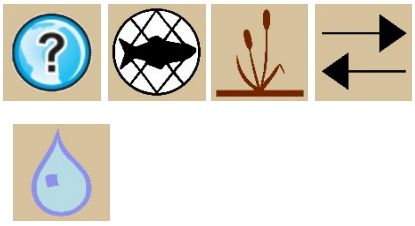
in timing and volume (Figure 10). Possible projects locations within this area include the following:

- Tucker, Tillman, and Spex Arth Creeks are smaller tributaries south of the Yakima River near Cle Elum that 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 extensive rearing and headwater habitat. These streams were disconnected from the Yakima River by water diversions and impassable barriers of which some have been addressed in recent years. Significant habitat potential exists in the upper watersheds, reportedly in good condition, but further assessments for habitat restoration including land acquisition, water exchange, conservation, and fish passage problems are needed.

- Taneum Creek enters the Yakima River at RM 166.1 and Manastash Creeks enters at RM 154.5. Both streams have been focal points for restoration for the past few decades, which has recently culminated in the removal of all significant fish passage barriers in the watersheds. These streams are important for steelhead spawning and rearing, and juvenile salmon use them for rearing habitat. Water exchange, water conservation, and habitat restoration projects and assessments are needed.

**Table 4.** YRBWEP enhancement measures for Upper Yakima Tributaries South (see Figure 10).

| Recommended measures | Tributary | Problems and needs |
|---|---|---|
|  | Tucker, Tillman, Spex Arth creeks | Habitat restoration including water exchange, restoration, and fish passage projects. |
|  | Big and Little creeks | Extensive headwater habitat recently made accessible. Assessment needed for fish passage, habitat, water conservation, and water exchange. |
|  | Taneum and Manastash creeks | Major passage and flow enhancement projects have been implemented. Assessment needed for fish passage, habitat, water conservation, and water exchange. |

## 4.4 Middle Yakima 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 (Figure 11). The upper portions of these drainages are forested and have fish passage barriers. 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 further assessment. Tieton Dam on the mainstem Tieton River forms Rimrock Reservoir. The confluence of the Bumping and Little Naches rivers forms the Naches River. Bumping Reservoir feeds the Naches River via Bumping River and has minimal effect on flow in the Naches River resulting in approximately 28 miles of somewhat unregulated river. Both reservoirs are among the five Reclamation regulated reservoirs in the Yakima Project and the Integrated Plan. Possible project locations within this area include the following:

- The American River, upper Naches River, Bumping River below the reservoir, and the Little Naches River watershed are all significant fish production tributaries in forested areas. These tributaries need to be assessed for fish passage and potential habitat improvement projects for Bull Trout, steelhead, Coho, and spring Chinook salmon. Recreation and forestry are 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 of the Forest Service Road 1800 bridge creating potential passage and stranding issues. In addition Bumping Dam lacks fish passage thereby isolating Bull Trout above the dam from other populations. This is of concern due to hybridization with non-native Brook Trout (*Salvelinus fontinalis*).

- Rattlesnake Creek enters the Naches 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. Nearby Nile Creek supports steelhead and salmon. Habitat and water conservation assessments 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 (*Oncorhynchus nerka*), a forage fish for Bull Trout. Clear Creek Dam on the North Fork Tieton River is a barrier to fish passage. A fish passage assessment for the South Fork Tieton River is underway to address a manmade waterfall that becomes a barrier when the reservoir is drawn down. The alluvial fan of Indian Creek is monitored annually for fish passage conditions.

- 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. Habitat restoration potential exists if the flow regime is altered.

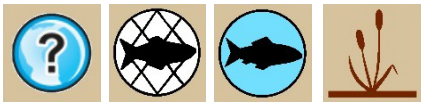
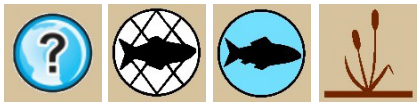
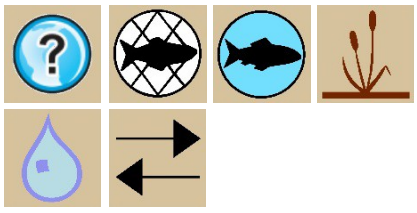
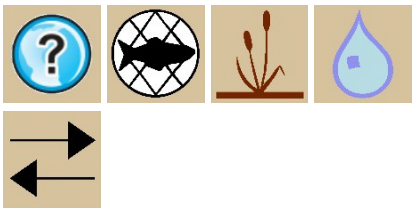
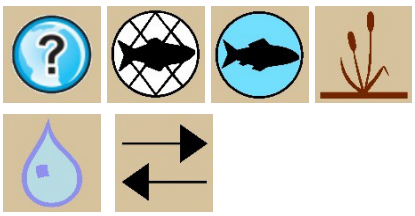
- Cowiche Creek enters the lower Naches River at RM 2.7. It has a drainage area of 120 square miles. The South Fork of Reynolds Creek and mainstem reaches of Cowiche Creek are suitable habitat for steelhead and Coho salmon. The North Fork of Cowiche Creek is intermittent between the mouth and the town of Cowiche, except during spring runoff and occurrences of operational spills from French Canyon Dam (Haring, 2001).

- The mainstem Naches River streamflow was improved significantly by the YRBWEP purchase of the Wapatox Power Plant. The power plant is located on the Naches River approximately 7.4 miles upstream from the confluence with the Yakima River. Operation of the power plant resulted in dewatering of the lower Naches River for decades. Water exchange projects, conservation, fish passage, and habitat enhancement projects and assessments are needed. There is potential for water conservation and exchange projects on the Naches-Selah, Wapatox, and Gleed irrigation canals to further enhance lower Naches River streamflows and passage improvements at Nelson Dam.

- Wenas Creek enters the Yakima River near RM 122.4. This creek was privately developed for irrigation when a dam was constructed in 1912 at creek mile 14.7 creating a complete barrier to upstream passage for migratory fishes. Lower Wenas Creek supports a small run of steelhead. Low flows and little riparian habitat are the limiting factors below the reservoir. Fish passage, including unscreened diversions, 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. The headwaters of Ahtanum Creek and tributaries are located in the Okanagon-Wenatchee National Forest and on the Yakama Nation Reservation. A very small resident population of Bull Trout spawns in Ahtanum Creek, and the creek also supports steelhead and salmon 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 15, 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.

**Table 5.** YRBWEP enhancement measures for Middle Yakima Tributaries (see Figure 11).

| Recommended measures | Tributary | Problems and needs |
|---|---|---|
|  | Upper Naches watershed: American, Little Naches, Bumping rivers | Forested areas may require habitat restoration or have fish passage barriers primarily related to road construction. |
|  | Deep Creek | Bumping Reservoir tributary with key Bull Trout population; fish passage barrier across reservoir bed during low flows and at other locations needs Assessment. |
|  | Rattlesnake Creek | Assessment of fish passage, habitat, water conservation, and water exchange projects are all needed. |
|  | North And South Fork Tieton rivers, Indian Creek | Assessment of fish passage alternatives for Clear Creek Dam and South Fork Tieton. Indian Creek passage requires monitoring. |
|  | Mainstem Tieton River, Naches River, Cowiche Creek | Irrigation related water conservation and water exchange projects have potential to improve flow in certain reaches of these tributaries. Fish passage and floodplain reconnection projects are underway or being assessed. |
|  | Wenas Creek | Assessment of water supply, conservation and water exchange projects, and potential is needed. Assessment of fish passage screening and potential passage at the dam needed. |
|  | Ahtanum Creek | Water conservation and water exchange projects have potential to improve flows and water supplies. Habitat restoration, fish passage, and floodplain connectivity needs assessment. |

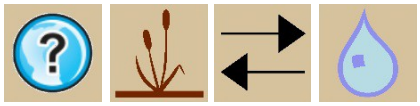
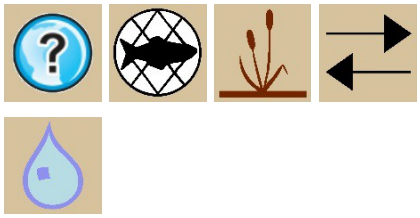
## 4.5 Lower Yakima River Tributaries

The tributaries flowing into the Lower Yakima River are shown in Appendix A - Maps: Figure 12, Lower Yakima Tributaries – Satus Creek and Toppenish Creek. These streams originate and flow through the Yakama Nation Reservation. See Table 6 descriptions for projects needed.

- 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. 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.

- 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 creek has been profoundly influenced by private and public irrigation development, diversions, check-dams, return-flow drains, and other features to manage water. 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. 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.

**Table 6.** YRBWEP enhancement measures for Lower Yakima Tributaries (see Figure 12).

| Recommended measures | Tributary | Problems and needs. |
|---|---|---|
|  | Satus Creek | Important steelhead producing stream. Needs habitat restoration, water conservation, and exchange projects to reduce WIP influence on lower creek and improve water quality. |
|  | Toppenish 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. |

# Chapter 5. Next Steps

The Title XII legislation states that Reclamation may implement a wide variety of measures to achieve project goals, including but not limited to water-use efficiency improvements, the use of Yakima Project canals and facilities to convey project or non-project water, the construction, operation, and maintenance of groundwater wells, the purchase of water rights from willing sellers, fish salvage and captive rearing, and the restoration of stream habitats. Reclamation anticipates the following next steps:

- Develop Bull Trout and steelhead recovery projects throughout the basin tributaries such as moving forward with constructing fish passage at Clear Creek Dam, continuing to support reconnection and habitat restoration on Gold Creek, habitat restoration on Box Canyon Creek, and determining the status of Bull Trout in the Cle Elum reservoir drainage. These actions could maintain or enhance existing Bull Trout population resiliency and gain a measure of protection against climate change.
- Continue to support tributary flow supplementation (i.e. KRD tributary flow supplementation program) that supports MCR steelhead spawning and rearing habitat in locations where water is over-appropriated and instream flows are inadequate to support aquatic resources.
- Work with Integrated Plan partners and others to evaluate tributary enhancement actions to identify high-priority enhancement actions.

# Chapter 6. Benefits

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:

- Provide water users with increased efficiency in using their water allotment.
- Facilitate conversion of gravity irrigation to pressurized sprinkler irrigation methods.
- Conserve energy by eliminating the need for electric pumps on farms.
- Reduce maintenance costs by replacing open canals with buried pipeline.
- Reduce seepage losses and provide better water management.
- Provide a reliable and higher-base instream flow in tributaries.
- Improve the extent and duration of instream flow within the seasonally dewatered reaches
- Improve the ability anadromous and resident fish populations to rear and migrate.

- Eliminate fish barriers on tributaries, and provide access to habitat above barriers for steelhead, Coho salmon, Bull Trout, and spring Chinook salmon.
- Increase instream flows to improve the quantity, quality, and diversity of other aquatic life, including aquatic insects and riparian vegetation.
- Protect juvenile fishes from entrainment in the irrigation delivery systems by screening the water diverted from tributaries.
- Directly address the most significant issues having an impact on fisheries in the watershed — the lack of access to intact headwater habitat because of diversion dam barriers and dewatering and unscreened water diversions.

# Chapter 7. Conclusion

Tributary enhancement is an important tool in efforts to recover MCR steelhead and Bull Trout in the Yakima River basin. Although extensive successful tributary enhancement projects have been completed in Taneum, Manastash, and Cowiche creeks, significant opportunities remain to improve both fishery and water supply efficiencies for agricultural resources in the tributaries of the Yakima River basin. Additional instream flows, stream and riparian enhancement, and floodplain improvements continue to be necessary for full restoration of ESA-listed species in the Yakima River basin.

Reclamation recommends pursuing future projects as outlined in the Integrated Plan's Mainstem Floodplain and Tributary Fish Habitat Enhancement Program (Reclamation and Ecology 2012) including habitat enhancement, flow restoration, fish barrier removal, screening diversions, piping laterals and canals, lining canals, reregulating reservoirs, and purchasing water to increase instream flows and enhance habitat.

Reclamation will continue to work with the Yakama Nation, State of Washington (Ecology and Fish and Wildlife), USFWS, NMFS, the Yakima Tributary Access & Habitat Program, irrigation districts, and water users to implement tributary enhancement projects throughout the Yakima River basin. Implementation will be contingent upon the agreement of the appropriate tributary water right owners to participate. Reclamation will determine the priority of the projects according to hydrologic, environmental, engineering, and economic factors, as well consideration of the impacts these actions would have on affected water users. During project development, Reclamation will review and evaluate alternatives, as well as seek consensus among stakeholders on actions selected for implementation.

By addressing key issues in the Yakima River tributaries, the projects and actions discussed in this investigation report would contribute to the recovery of salmonid species in the Yakima River basin. In summary, tributary enhancement provides major benefits to both agricultural and fisheries resources and demonstrates how basin stakeholders can work together to achieve these benefits.

Reclamation will submit this programmatic tributary investigation report to the Committee on Energy and Natural Resources of the U.S Senate, the Committee on Natural Resources of the U.S. House of Representatives, the Governor of the State of Washington, and it will also be made available to the public to serve as compliance with Section 1207 of Title XII, of Public Law 103-434 which requires submission of the investigation report to the congressional committees prior to appropriation of funds for the proposed tributary enhancement program.

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| References Cited | Description |
|---|---|
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| 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. *2009 Yakima steelhead recovery plan.* Yakima, WA. 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/ |

# Chapter 9. Letters of Support

# Appendix A - Maps

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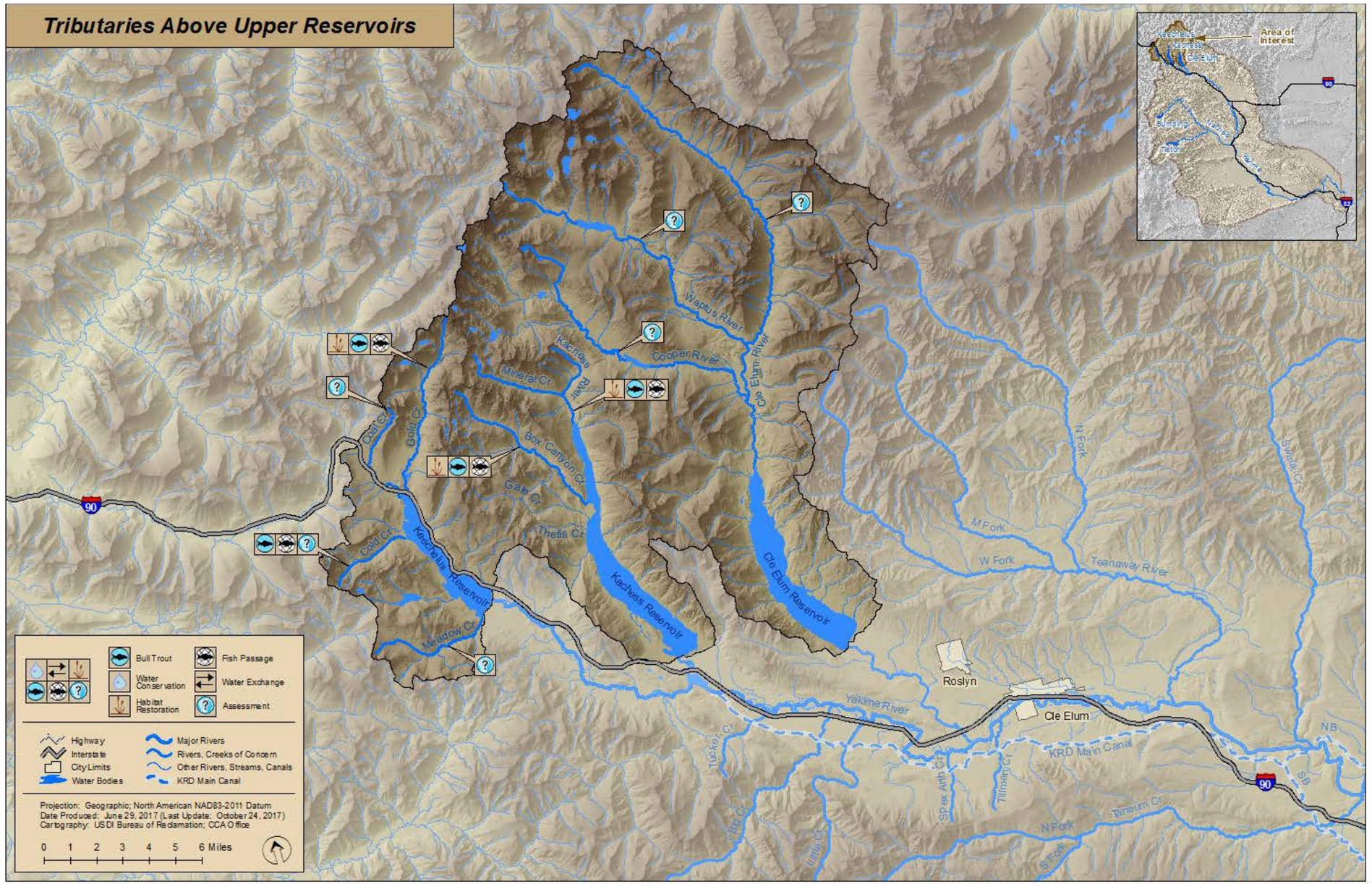


**Figure 8.** Tributaries Above Upper Reservoirs are discussed in Section 4.1. Basinwide tributary enhancement above the Keechelus, Kachess, and Cle Elum reservoirs.

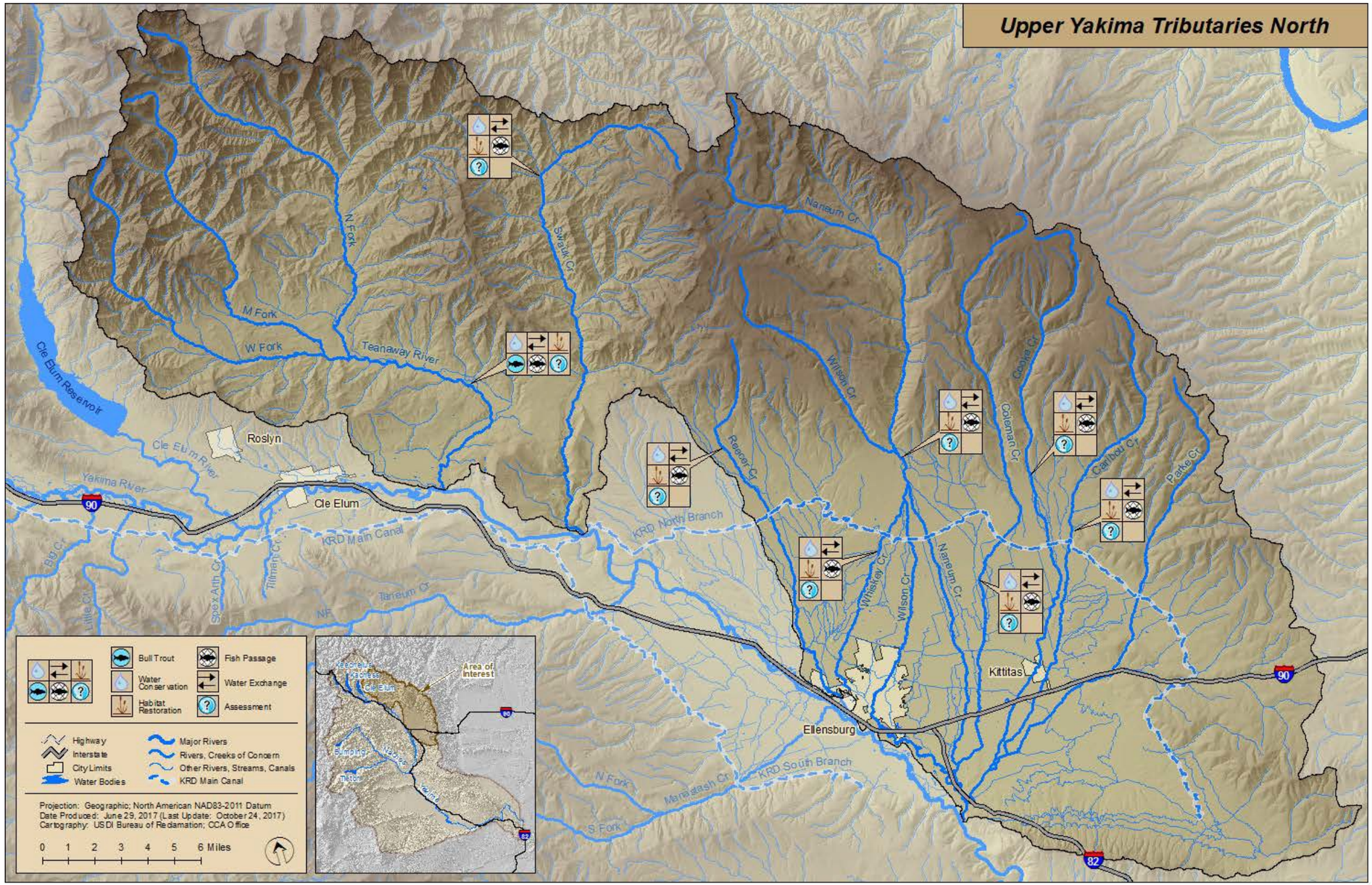


**Figure 9.** Upper Yakima Tributaries North as discussed in Section 4.2. Basinwide tributary enhancement projects on the North side of the Kittitas Valley that cross the KRD Canal below the reservoirs.

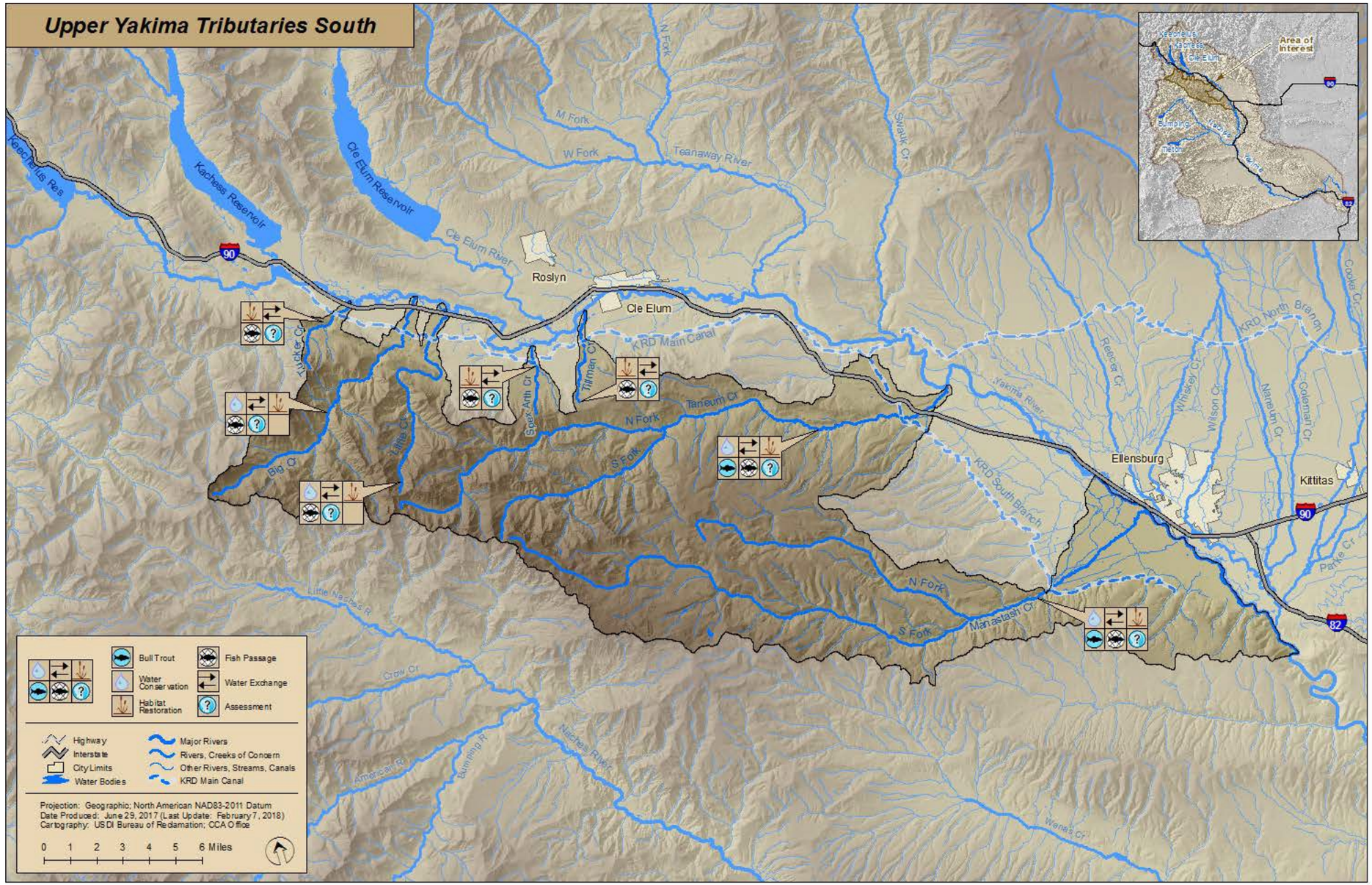


**Figure 10.** Upper Yakima Tributaries South as discussed in Section 4.3. Tributaries Intersecting KRD Main Canal are south of the Yakima River.

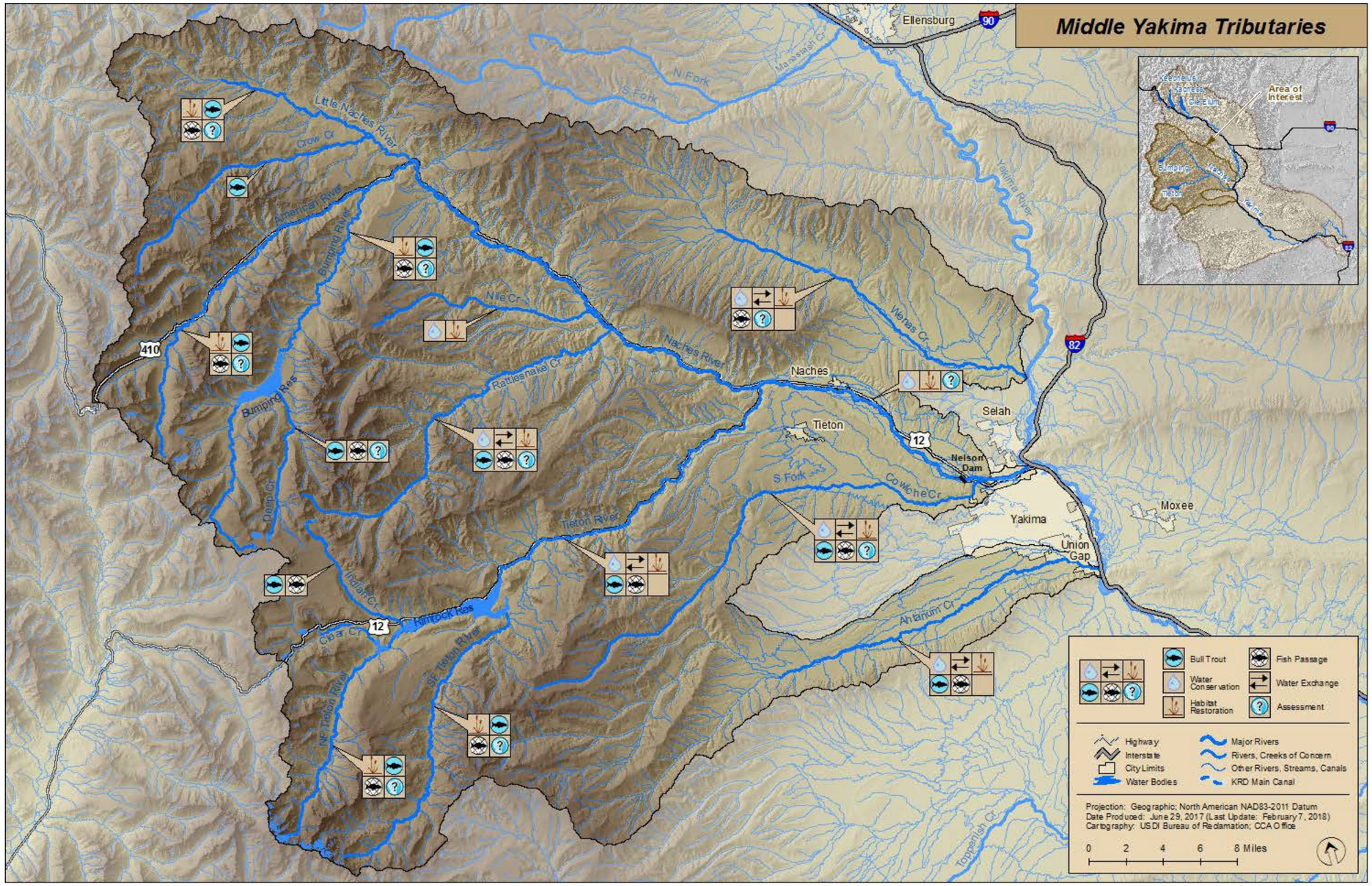


**Figure 11.** Middle Yakima Tributaries as discussed in Section 4.4. Map shows tributaries flowing into the Naches River above Tieton Dam at Rimrock Reservoir.

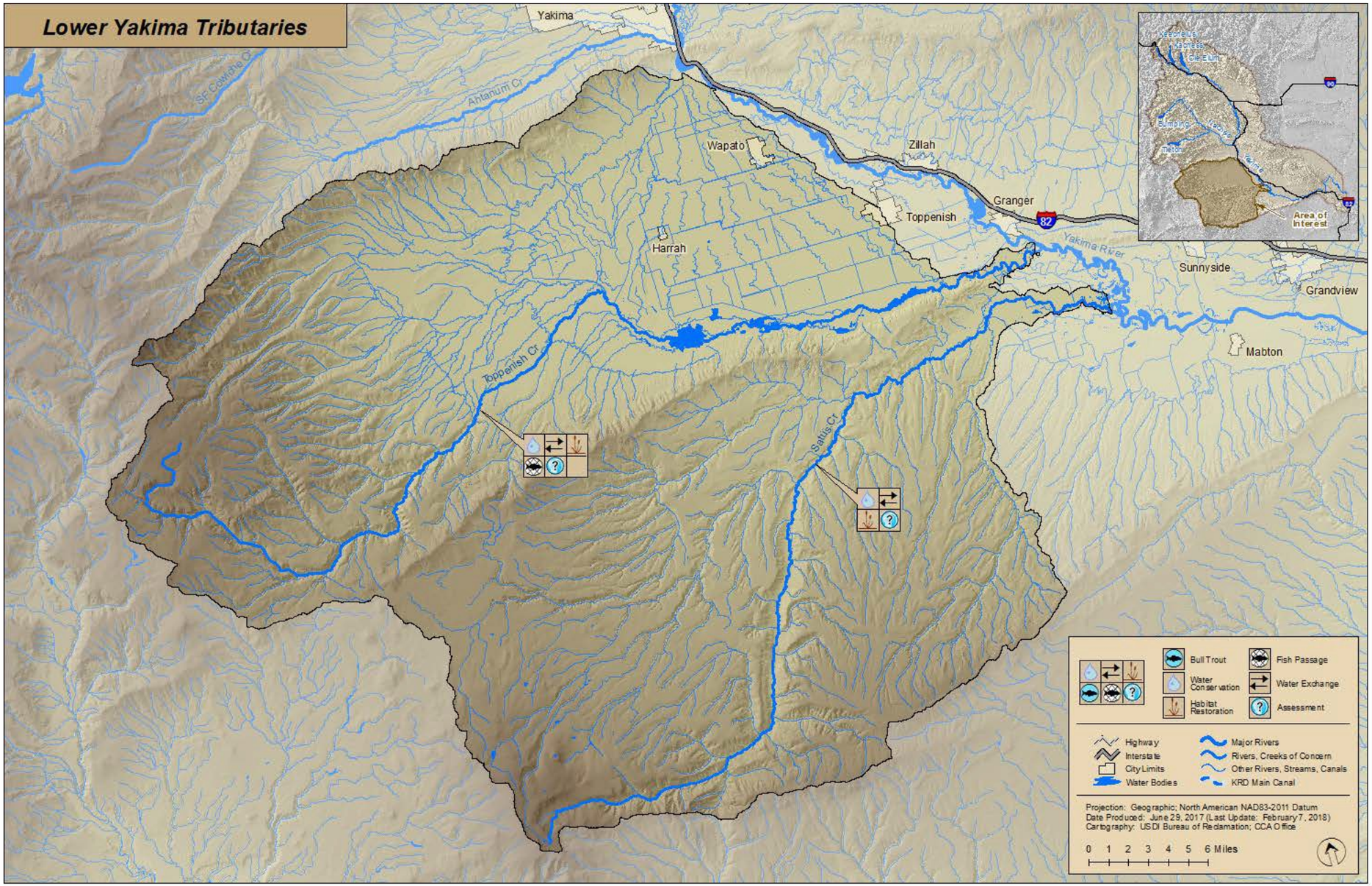


**Figure 12.** Lower Yakima Tributaries as discussed in Section 4.5. Satus Creek and Toppenish Creek both flow into the lower Yakima River.