RECLAMATION
Managing Water in the West

Biological Assessment of Potential Effects to Middle Columbia River Steelhead from the MANASTASH CREEK WATER CONSERVATION AND TRIBUTARY ENHANCEMENT PROJECT

Yakima River Basin Water Enhancement Project

Yakima Project, Washington

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

February 2013

Mission Statements

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Biological Assessment of Potential Effects to Middle Columbia River Summer Steelhead from the Manastash Creek Water Conservation and Tributary Enhancement Project

Prepared For:

National Marine Fisheries Service
510 Desmond Drive S.E., Suite 100
Lacey, WA 98503-1273

Prepared By:

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Columbia-Cascades Area Office
Yakima, WA 98901

February 15, 2013

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INTRODUCTION

Manastash Creek is an important tributary of the Upper Yakima River and historically supported significant salmonid populations including the currently listed Mid-Columbia River steelhead. The forested upper watershed is mostly public land and supports good quality habitat. As Manastash Creek crosses an open alluvial plain sloping toward the Yakima River, water is diverted from the creek to irrigate farmland. These irrigation withdrawals have occurred since the early 1870s. At present, a 3.2-mile reach of lower Manastash Creek is seasonally dewatered by irrigation water withdrawals. While upper Manastash Creek contains areas of suitable habitat, it is presumed that passage barriers and seasonal dewatering events prevent anadromous fish use (NPCC, 2004).

Since restoring fish passage in tributary streams such as Manastash Creek is an integral part of restoring Yakima River basin fish runs (Haring 2001), there has been a coordinated effort to address fish passage barriers, consolidate diversions, and screen diversions on Manastash Creek. The Manastash Creek Steering Committee, with assistance from the Kittitas County Conservation District, has been working to implement a suite of actions to address fish barriers and unscreened diversions. As a result of their efforts, fish screens have been added and fish passage barriers corrected at three diversions (Barnes Road, Manastash Water Ditch Association [MWDA], and Keach-Jensen Ditch). Once three additional diversions (Reed, Anderson, and Hatfield) are consolidated with the MWDA diversion, no passage barriers or unscreened diversions will remain on Manastash Creek.

The Bureau of Reclamation has been working with the Kittitas Reclamation District (KRD) on a project that would convert an existing irrigation lateral in the vicinity of Manastash Creek to gravity-pressurized pipes. The water savings realized from this project would be delivered to Manastash Creek, increasing streamflow by an average of 3-4 cfs during irrigation season. Additionally, Reclamation proposes to construct a portion of the pipeline needed to serve the Reed and Hatfield water users so that their diversions can be consolidated with the MWDA. The construction of this pipeline would occur at the same time and on the same easement as the KRD lateral to be piped.

Purpose of this Document

This biological assessment (BA) covers actions that the United States Department of the Interior, Bureau of Reclamation, proposes to take in order to construct two pipelines in the Kittitas Reclamation District's 13.8 open-ditch lateral. This BA has been prepared to facilitate coordination between Reclamation and National Marine Fisheries Service (NMFS).

In addition to ESA consultation, the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). Reclamation requests that NMFS utilize the project description and effects analysis included in this BA to determine whether or not the Proposed

Action “may adversely affect” designated EFH for relevant commercially, federally-managed fisheries species within the Proposed Action area (Chinook and coho).

Proposed Action

Project Description

There are two key component of the Proposed Action:

1. Replace the currently unlined 13.8 Lateral of KRD’s South Branch Canal with 3.2 miles of pipeline (see Figure 1 and Figure 2). The new South Branch 13.8 Lateral Pipeline will be pressurized by the gravity head resulting from piping the irrigation water from the South Branch Canal which is considerably higher in elevation than the farmlands that will be served. This pipeline will serve KRD water users. As part of this conversion to a gravity-pressurized pipeline, a new undershot crossing of Manastash Creek will be constructed.
2. Work in conjunction with the Manastash Steering Committee to construct an additional pipeline beginning at the intersection of 13.8 Lateral and the MWDA Ditch and ending at the crossing of the Reed Ditch **(**Figure 3**).** This pipeline will be approximately 1.1 mile long and called the Consolidated Diversion Pipeline, serving the Hatfield and Reed users.

The Manastash Creek Water Conservation and Tributary Enhancement Project involves converting an open-ditch delivery system to a buried enclosed pipeline. There will be two pipelines in the first 1.1 mile of the 13.8 Lateral—one will deliver water to Reed and Hatfield Ditches and the other pipeline will deliver water to KRD. The total length of the KRD pipeline is approximately 3.2 miles and the approximate length of the Consolidated Diversion Pipeline is 1.1 mile. Both pipelines will start out as 30-inch-diameter pipes and the 13.8 Lateral will end up as a 6-inch-diameter pipe. The single KRD pipe will cross the Manastash Creek at approximately mile 2 of the pipeline. The pipe crossing currently at that crossing will be removed and replaced with a new crossing (see Figure 4 and Figure 5).

Activities will occur in this general order:

1. Reclamation will enter into a construction contract in mid-to-late August 2013.
2. Contractor will mobilize on site at designated approved areas in September 2013.
3. The underground creek crossing will be constructed first in order to complete all work associated with the creek while dry. Manastash Creek is normally dewatered from late June to mid-October due to irrigation diversions; construction of the crossing will take place from September to mid-October, 2013.
4. The contractor will use excavators and backhoes to remove the old pipe in the dry creekbed and place the new pipe under the creek for maximum depth and length so as not to interfere with the natural hydrologic creek process.

Figure 1. KRD 13.8 Lateral

Figure 2. KRD 13.8 Lateral

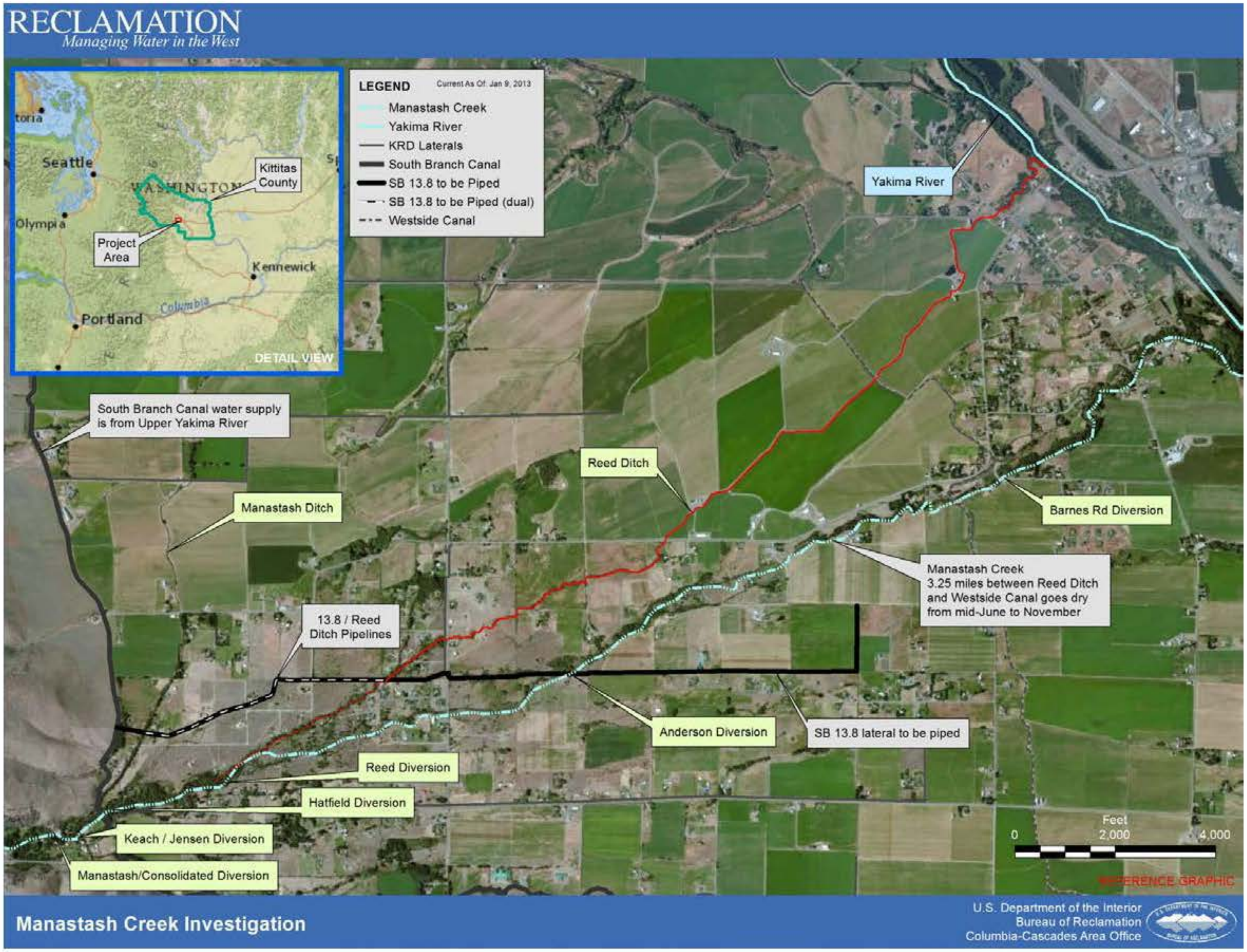

Figure 3. Map of piping project elements

Figure 4. Manastash Creek downstream of bridge and pipe crossing

Figure 5. Manastash Creek upstream of bridge and pipe crossing

The creek channel will be reconstructed at the pipe crossing with adequate bioengineering techniques to ensure the pipeline crossing will not have a detrimental effect on the creek. The contractor will reshape and re-grade fill and armor to match streambed contours upstream and downstream of the pipe crossing.

5. The riparian areas associated with the pipe crossing will be revegetated and the streambank will be contoured to protect channel function.
6. Once the irrigation season is over for the year (approximately October 20), the pipeline construction will begin and continue until the construction is complete, approximately December 31, 2013.
7. Demolish existing headgate on the South Branch Canal and associated buried piping of approximately 600 feet.
8. Install approximately 4 miles of Reclamation-owned gravity-pressurized buried PVC pipe ranging in size from 30-inch-diameter to 6-inch-diameter, including several air/vacuum valve assemblies. The first 1.1 mile will have two 30-inch pipes side by side in the 13.8 Lateral alignment.
9. Install approximately 37 irrigation turnouts ranging in size from 12-inch-diameter to 1.5-inch-diameter, including isolation valves and mechanical flow meters
10. Install mainline pressure-reducing station and several energy-dissipation facilities at specific turnouts.
11. Demolition of numerous concrete check structures and turnouts.
12. Install pipeline beneath three Kittitas County roadways (two gravel roadways and one asphalt roadway).

Construction of the buried pipeline will be designed to assure that the pipeline does not provide a pathway for groundwater nor divert surface or hyporheic water from Manastash Creek. In general, the project involves digging a trench along the same alignment as the 13.8 Lateral open ditch and placing pipe in the trench.

Interrelated and Interdependent Actions

Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification (50 CFR 402.02). Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

The Proposed Action involves interrelated and interdependent actions. The proposed action is part of a larger, longer term action of additional projects related to the Manastash Creek Restoration Project (MCRP, 2007) being proposed by the Manastash Creek Steering Committee. The Proposed Action allows for the consolidation of the Reed, Hatfield, and Anderson ditches, which enables the removal of the diversion facilities associated with those ditches. The construction of the second 1.1-mile pipeline, parallel to the 13.8 Lateral Pipeline, is for the future use of the Reed and Hatfield water users. The construction of the gravity-pressurized pipelines will enable potential future water savings that could be used for instream flow benefits. It is anticipated that additional KRD laterals associated with Manastash Creek will be converted from open ditches to pressurized pipelines and save additional water for instream flow in Manastash Creek.

Environmental Baseline

Summer Steelhead Trout (*Oncorhynchus mykiss*)

The Middle Columbia River (MCR) Evolutionarily Significant Unit (ESU) of inland steelhead (*Oncorhynchus mykiss*) was listed as "Threatened" by NMFS on March 25, 1999. The MCR ESU includes all naturally spawned populations of steelhead in streams from above the Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington (64 FR 14517). Steelhead from the Snake River Basin are excluded from this ESU. Recently, NMFS issued its final listing determinations for 10 Distinct Population Segments (DPS) of west coast steelhead (71 FR 834). The MCR steelhead DPS remained listed as threatened in that listing document.

General Life History and Yakima River Population Characteristics

Steelhead are phylogenetically and ecologically complex, exhibiting perhaps the most diverse life history patterns of any Pacific salmonid species (Shapovalov and Taft, 1954; Barnhart, 1986). *O. mykiss* display varying degrees of anadromy, differences in reproductive biology, and plasticity of life history between generations (Busby et al., 1996).

Steelhead on the west coast of the United States have declined in abundance in the past several decades as a result of natural and human factors (NMFS, 1996b; NMFS, 1998). Forestry, agriculture, mining, and urbanization have degraded, simplified, and fragmented habitat (NRCC, 1996). Water diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat. Loss of habitat complexity, such as reductions in wetlands and deep pools, has contributed to the decline of steelhead (NMFS, 1996b). Studies estimate that during the last 200 years, the lower 48 states have lost approximately 53 percent of all wetlands and the majority of the remaining wetlands are severely degraded (Dahl, 1990; Tiner, 1991). Washington's and Oregon's wetlands are estimated to have diminished by one-third, while California has experienced a 91-percent loss of its wetland habitat (Dahl, 1990; Jensen et al., 1990; Barbour et al., 1991; Reynolds et al., 1993). In national forests in Washington, there has been a 58-percent reduction in large, deep pools due to sedimentation and loss of pool-forming structures such as boulders and large wood (FEMAT, 1993). In Oregon, the abundance of large, deep pools on private coastal lands has decreased by as much as 80 percent (FEMAT, 1993). Sedimentation from land use activities is recognized as a primary cause of habitat degradation in the range of west coast steelhead.

All steelhead in the Columbia River Basin upstream from The Dalles Dam are summer-run, inland steelhead (Schreck et al., 1986). Life history information for steelhead of this DPS indicates that most MCR steelhead smolt at 2 years and spend 1, 2, or rarely, 3 years in the ocean prior to reentering fresh water. On their spawning migration, adult steelhead enter the Columbia River in mid-May and pass over Bonneville Dam between July and August. Summer-run steelhead adults remain up to a year in fresh water prior to spawning.

The MCR steelhead population size is substantially lower than historic levels, and at least two extinctions are known to have occurred in the DPS. Based on historic estimates, the MCR DPS run size could have been in excess of 300,000 fish (Busby et al., 1996). This figure may be an overestimate, since it is largely based on historical estimates of steelhead returns to the Yakima River basin. Other crude estimates, based on the size of the Yakima watershed and salmon and steelhead harvests in the Columbia River (Chapman, 1986) lead to lower estimates of historical abundance for the entire MCR DPS. Similarly, there is uncertainty about how many steelhead existed in the Yakima River basin historically. Although run size estimates vary, numerous early surveyors and visitors to the Yakima basin reported a robust and widespread steelhead population (Bryant and Parkhurst, 1950; Davidson, 1953; Fulton, 1970; NPCC, 1986; McIntosh et al., 1990). The Washington Department of Fisheries estimated that the Yakima River had annual run sizes of 100,000 steelhead prior to development (WDF, 1993). However, other historic run size estimates are substantially lower than this figure. For example, Cramer et al. (2003) suggests that production of steelhead in the Yakima River was less than 50,000 fish based on various estimates. Kreeger and McNeil (1993) estimated the historic run of steelhead to the Yakima River was about 20,800 adults based on Columbia River harvest statistics and amount of area the Yakima watershed occupies within the Columbia Basin.

Despite the variation in these historic estimates for the MCR DPS and the Yakima River, all estimates are higher than current abundance levels. Returning adult steelhead are counted and classified as wild or hatchery as they pass the fish ladders at Prosser Dam. Within the Yakima River basin, adult steelhead returns have averaged 1,927 fish (range 505 to 4,491) over brood years 1985 to 2009, as monitored at Prosser Dam (River Mile (RM) 47.1), which is downstream of virtually all current spawning locations (YSPB, 2005; YKFP, 2011). The relative number and timing of wild adult steelhead returning during the fall and winter-spring migration periods varies from year to year (Reclamation, 2000; NPCC, 2004). The run is dominated by wild fish, with a hatchery component of 8 percent over the period of record and 3 percent between 1999 and 2007. Hatchery releases of steelhead into the Yakima system ceased after 1993 (NPCC, 2004); as a result, the proportion of returning spawners at Prosser Dam that are of natural origin has averaged 94 percent since 1985 and has increased to 99 percent for the most recent 5-year period Figure 6). The Interior Columbia Technical Recovery Team (ICTRT) assumed that hatchery strays were not disproportionately present in any specific populations within the Yakima Major Population Group.

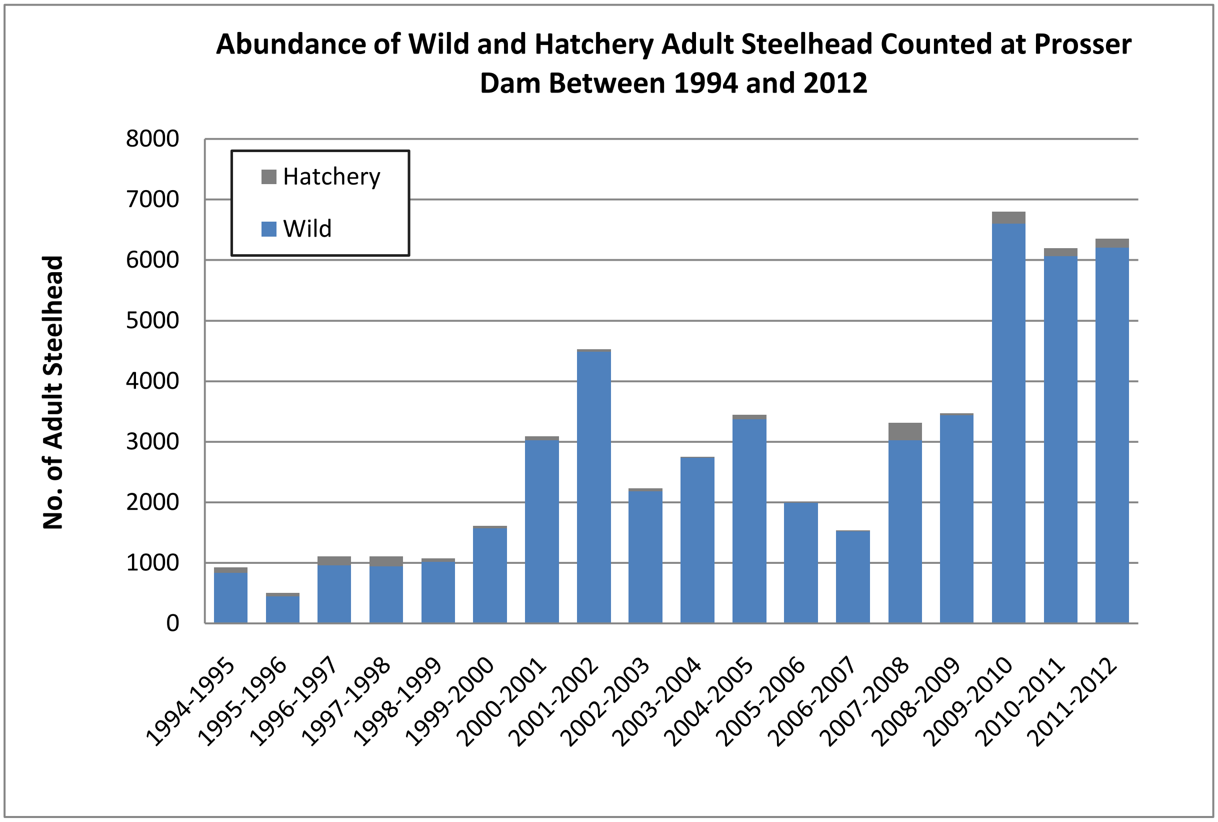

Figure 6. Abundance of both wild and hatchery steelhead adults counted at Prosser Dam (RM 47.1) for brood years 1994-95 through 2011-12

Figure 7 gives an indication of the variability of recent steelhead returns as measured at Prosser Dam at RM 47.1. At the time of listing (1999), the 10-year average abundance for wild steelhead at Prosser Dam was 933 fish, the majority of which were being produced in a single tributary drainage, Satus Creek, which flows into the Yakima River near Granger. Since 1999, steelhead abundance has increased, with the current 10-year average (1999-2008) numbering 2,614 adults. Upstream dam, redd and smolt trap counts have also revealed a somewhat wider distribution of steelhead in the Yakima basin than was recognized in 1999.

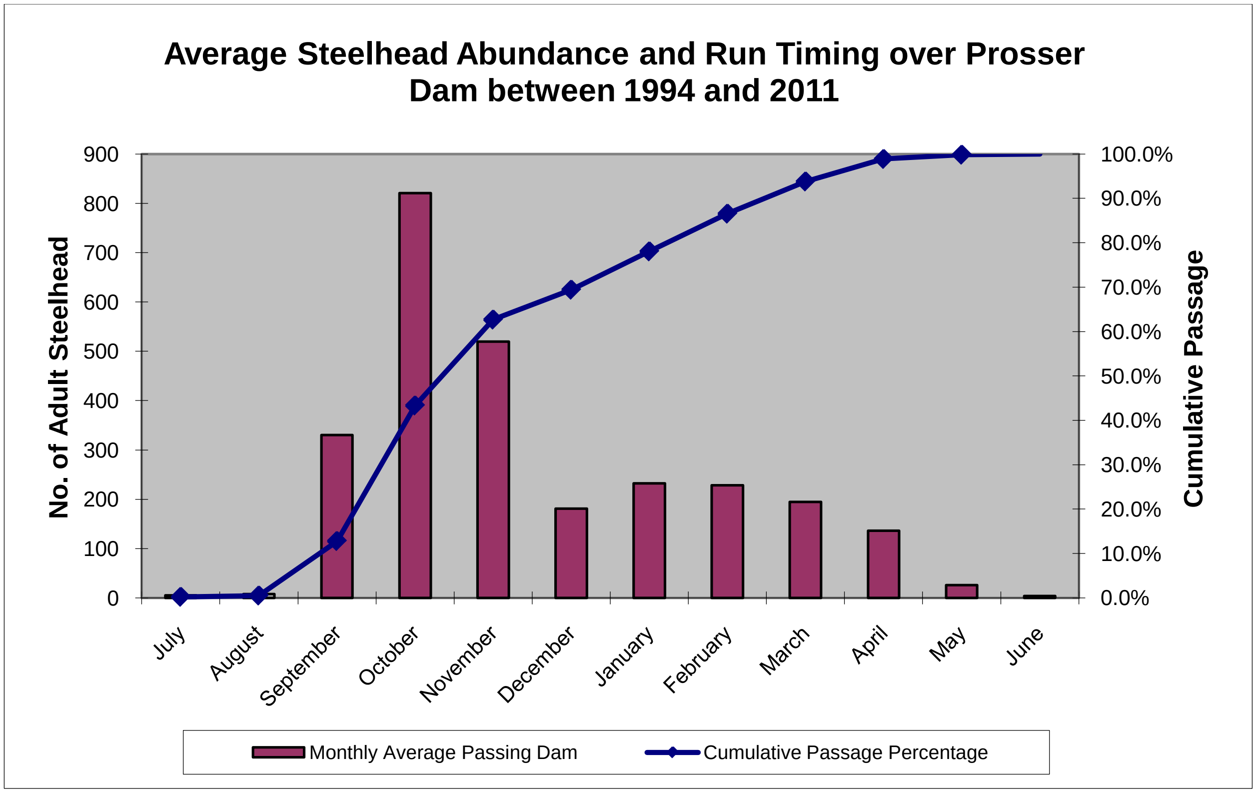

Figure 7. Average steelhead abundance by month and cumulative passage timing of steelhead passing Prosser Dam between 1994 and 2011. Data are from the Yakima Klickitat Fisheries Project (YKFP) website and Haring 2001

While at least some adult steelhead movement into the Yakima basin and past Prosser Dam has been documented in every month of the year, the main migration past Prosser Dam occurs from September through April. Passage from the McNary Pool on the Columbia River and/or Lower Yakima River past Prosser Dam appears to be driven by flow and temperature cues, with fish holding in the lower river and generally moving rapidly upstream following increased flow and moderating water temperatures.

Generally, adult MCR steelhead migration into the Yakima basin has a bimodal distribution with peaks in late October and again in late January or early March. Figure 8 indicates the predominant upstream migration timing pattern for adult steelhead into and through the lower Yakima River as measured at Prosser Dam (RM 47.1) between 1994 and 2008. Minimal numbers of adult steelhead pass Prosser Dam during July and August, with numbers beginning to increase in September. Peak passage timing above Prosser Dam occurs in October and November when a combined 50 percent of the steelhead run occurs at this location. Steelhead abundance over Prosser Dam declines slightly in December and early January due to the onset of cold water temperatures and low streamflows. Usually by the end of December, over 70 percent of the run has passed Prosser Dam. During this time, about one-third of the run holds between McNary Pool in the Columbia River and Prosser Dam in the Yakima River. These fish are thought to be using habitat in both the McNary Pool (where temperatures are lower through the summer) and the lower Yakima River, which cools off faster than the McNary Pool after September 1. The steelhead migration over Prosser Dam resumes in February through April, coincident with behavioral cues related to the spawning run and physical cues associated with increases in water temperatures and streamflows. Adult steelhead migration is essentially completed at Prosser Dam by the end of April (YKFP, 2011).

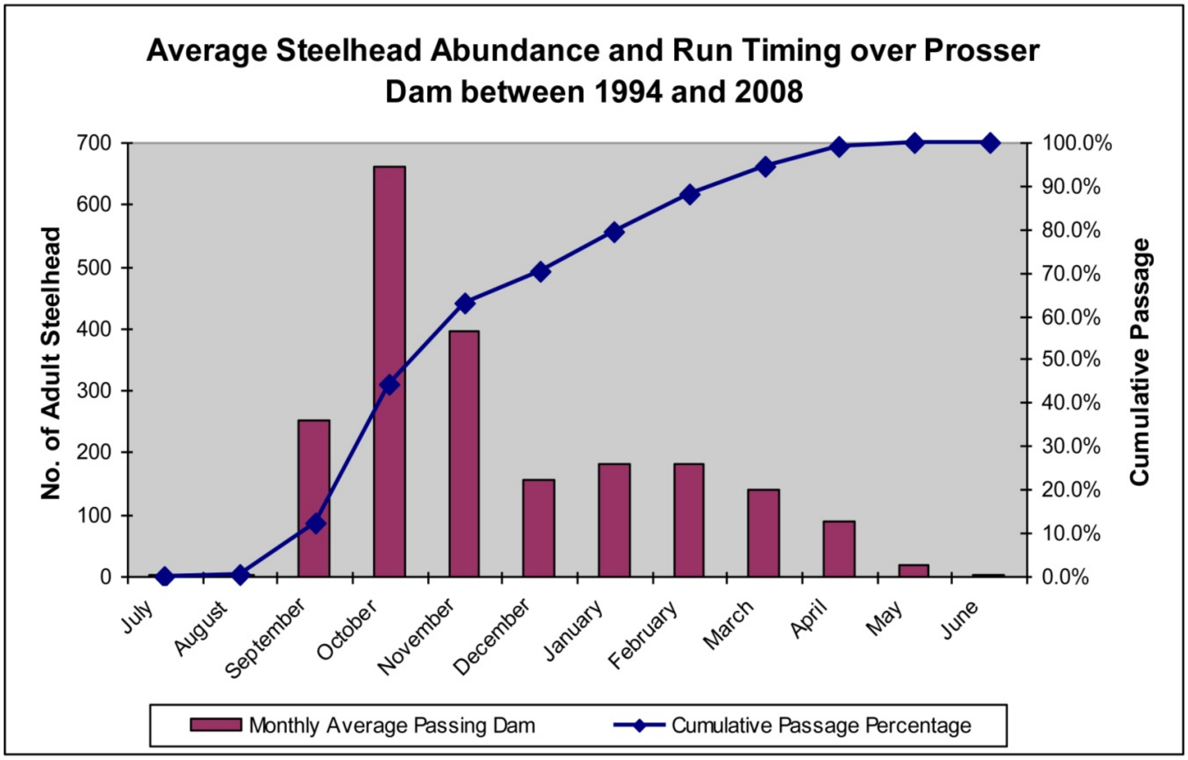

Figure 8. Average steelhead abundance by month and cumulative passage timing of steelhead passing Prosser Dam between 1994 and 2008. (YKFP, 2011; Haring, 2001).

After entry into the Yakima River, approximately 60 percent of adult steelhead overwinter in the mainstem between Prosser (RM 47.1) and Sunnyside Dams (RM 103.8), while 28 percent use areas downstream of Prosser Dam for overwintering before moving upstream into tributary or mainstem spawning areas (Hockersmith et al., 1995). The remaining 12 percent of tagged steelhead from the Hockersmith study were observed overwintering in the Yakima River between Sunnyside Dam and the Naches River confluence. The final upstream migration from mainstem holding or overwintering areas to the spawning grounds begins between January and May, with fish that spawn in lower elevation tributaries generally beginning to move earlier.

The historical distribution of Yakima steelhead is thought to have included all reaches of the Yakima River mainstem and its tributaries that supported spring Chinook salmon

(*O. tshawytshca*), as well as many other tributaries (Yakama Nation et al., 1990). As steelhead spawners are capable of utilizing smaller streams with steeper gradients than spring Chinook, most accessible permanent streams and some intermittent streams may have once supported spawning steelhead. Currently, Yakima River steelhead are found in nearly all mainstem and tributary reaches; however, access to portions of the headwaters of the Yakima River and some tributaries are blocked by dams and other passage barriers. As a result, anadromous steelhead cannot access the entire Yakima River watershed.

Hockersmith et al. (1995) identified the following spawning populations within the Yakima basin:

- Upper Yakima River above Ellensburg,
- Teanaway River,
- Swauk Creek,
- Taneum Creek,
- Roza Canyon,
- Mainstem Yakima River between the Naches River and Roza Dam,
- Little Naches River,
- Bumping River,
- Naches River,
- Rattlesnake Creek,
- Toppenish Creek,
- Marion Drain, and
- Satus Creek.

Of 105 radio-tagged fish observed from 1990 to 1992, Hockersmith et al. (1995) found that well over half of the spawning occurred in Satus and Toppenish Creeks (59 percent), with a smaller proportion in the Naches drainage (32 percent), and the remainder in the mainstem Yakima River below Wapato Dam (4 percent), mainstem Yakima River above Roza Dam (3 percent), and Marion Drain (2 percent), a Wapato Irrigation Project drain tributary to the Yakima River. Electrophoretic analyses have identified four genetically distinct spawning populations of wild steelhead in the Yakima basin—the Naches, Satus, Toppenish, and Upper Yakima stocks (Phelps et al., 2000).

Steelhead spawning varies across temporal and spatial scales in the Yakima Basin, although the current spatial distribution is significantly decreased from historic conditions. Yakima Basin steelhead spawn in intermittent streams, mainstem and side-channel areas of larger rivers, and in perennial streams up to relatively steep gradients (Hockersmith et al., 1995; Pearsons et al., 1996). Typically, steelheads spawn earlier at lower, warmer elevations than higher, colder waters. Overall, most spawning is completed within the months of January through May (Hockersmith et al. 1995), although steelhead have been observed spawning in the Teanaway River (RM 176.1), a tributary to the Upper Yakima into July (Pearsons, 2002).

Steelhead eggs take about 30 days to hatch at 50 degrees Fahrenheit, and another 2-3 weeks before fry emerge from the gravel. However, time required for incubation varies significantly with water temperature. Fry emergence typically occurs between mid- to late May and early July, depending on time of spawning and water temperature during incubation.

Juvenile steelhead utilize tributary and mainstem reaches throughout the Yakima and Naches basins as rearing habitat, until they begin to smolt and emigrate from the basin. Smolt emigration begins in November, peaking between mid-April and May. Busack et al. (1991) analyzed scale samples from smolts and adult steelhead and found that the smolt transformation typically occurs after 2 years in the Yakima system, with a few fish maturing after 3 years and an even smaller proportion reaching the smolt stage after 1 year. When compared to spawning distribution and run timing, these data suggest that various life stages of listed steelhead may be present throughout the Yakima basin and its tributaries virtually every day of the calendar year.

Water temperatures in the lower Yakima River may contribute to lower survival of smolts and kelts during summer months (Vaccaro, 1986; Lichatowich and Mobrand, 1995; Lichatowich et al., 1995; Pearsons et al., 1996; Lilga, 1998). Steelhead kelts and smolts have been observed at the Chandler Juvenile Enumeration Facility (RM 47.1) into the middle of July, when water temperatures can become lethal. Conditions in the lower Yakima River become suitable once again for salmonids in early fall near the end of the irrigation season (NPCC, 2004).

Upper Yakima River Steelhead Population

Although adult run sizes above Roza Dam are not large, they constitute an important part of the overall MCR steelhead ESU. Since 1985, steelhead abundance in the Upper Yakima River above Roza Dam has averaged about 92 to 108 returning adults, depending on the data source analyzed (YKFP, 2011; Haring, 2001; Columbia River DART, 2011). Figure 9 shows the total steelhead run size for the Upper Yakima River stock and the number of adults passing Roza Dam for the years 1985 to 2008 from these various data sources.

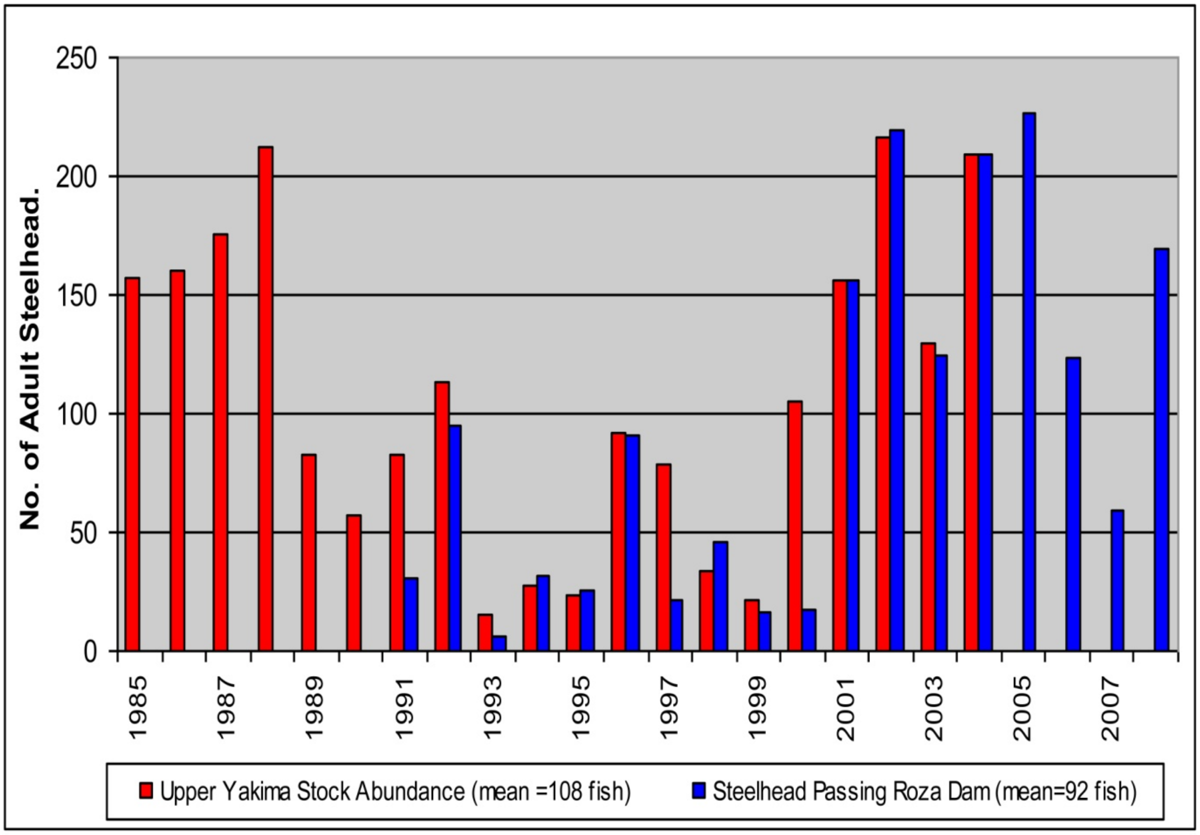

Figure 9. Abundance of the Upper Yakima River stock and total number of steelhead passing Roza Dam (RM 127.9) between 1985 and 2008 (YKFP, 2011; Haring 2001)

Data provided in Figure 9 indicate some level of inconsistency in data records for the Upper Yakima River stock abundance and fish ladder counts at Roza Dam. Most of these inconsistencies occurred as a result of inadequate monitoring of fish passage at the dam prior to 2001 or because of lack of recordkeeping related to steelhead passage. However, the data from 2001 to the present are considered to be the most accurate because more detailed recordkeeping and specific monitoring activities for anadromous steelhead passage at Roza Dam has taken place at the Yakama Nation adult counting facility during this time period.

For run years 1993 to 2005, Roza Dam counts were incorporated into abundance estimates for the Upper Yakima population by the Yakima Basin Fish and Wildlife Recovery Board (YBFWRB, 2009). During the Hockersmith et al. study (1995), some radio-tagged steelhead were tracked to the mainstem Yakima River below Roza Dam, but above the confluence with the Naches River. To account for possible spawning below Roza Dam, the year-specific counts at Roza Dam were averaged with corresponding estimates based on the 1990 to 1992 radio telemetry proportion returning to the Upper Yakima (YBFWRB, 2009).

As indicated by the Hockersmith study, only a small percentage of steelhead that enter the Yakima basin each year migrate to habitat areas in the Upper Yakima River upstream of Roza Dam. For example, only 3 percent of all adult steelhead that were tagged and monitored for migration timing and distribution during the 3-year long Hockersmith study (1989-1993) were radio-tracked to areas upstream of Roza Dam. More recent data on steelhead abundance and distribution within the Yakima basin indicate that only between 3.8 and 9.4 percent of all steelhead entering the Yakima basin migrated into the Upper Yakima River above Roza Dam between 2001 and 2011 (Table 1).

Table 1. Abundance of steelhead passing Prosser Dam (RM 47.1) and Roza Dam (RM 127.9) indicating the percentage of fish utilizing the Upper Yakima River for brood years 2000-2011

Brood Year	Number of Steelhead Passing Prosser Dam	Number of Steelhead Passing Roza Dam	Percent of Total Run Above Roza Dam
2000-2001	3,089	139	4.5%
2001-2002	4,525	236	5.2%
2002-2003	2,235	133	5.9%
2003-2004	2,755	209	7.5%
2004-2005	3,425	227	6.6%
2005-2006	2,005	123	6.1%
2006-2007	1,540	59	3.8%
2007-2008	3,310	169	5.1%
2008-2009	3,450	204	5.9%
2009-2010	3,469	326	9.4%
2010-2011	6,796	346	5.1%
2011-2012	6,359	413	6.5%

Annual monitoring of steelhead passage upstream of Roza Dam at the Yakama Nation adult counting facility as well as data collected for the radio tracking study have provided new and important information on the timing of steelhead migrations into the Upper Yakima River basin. For example, of the 669 wild adult steelhead that ascended the Roza Dam fish ladder from fall 2002 to spring 2006, the vast majority showed a peak arrival time of March and April, but could occur anytime between September and late June (Reclamation, 2003; 2005; 2009). The number of adult steelhead ascending the Roza Dam ladder during the winter period between 1996 and spring of 2008 were distributed in the pattern exhibited in Figure 10. Eighty-eight percent of steelhead passage past Roza into the Upper Yakima occurs in March, April, and May, with the remaining 12 percent scattered from September through February. This migration timing information coincides well with the existing spawn timing information for the Upper Yakima River and tributaries which suggests that spawning occurs from late April through early June, with a peak in May (NPCC, 2004; Reclamation, 2009).

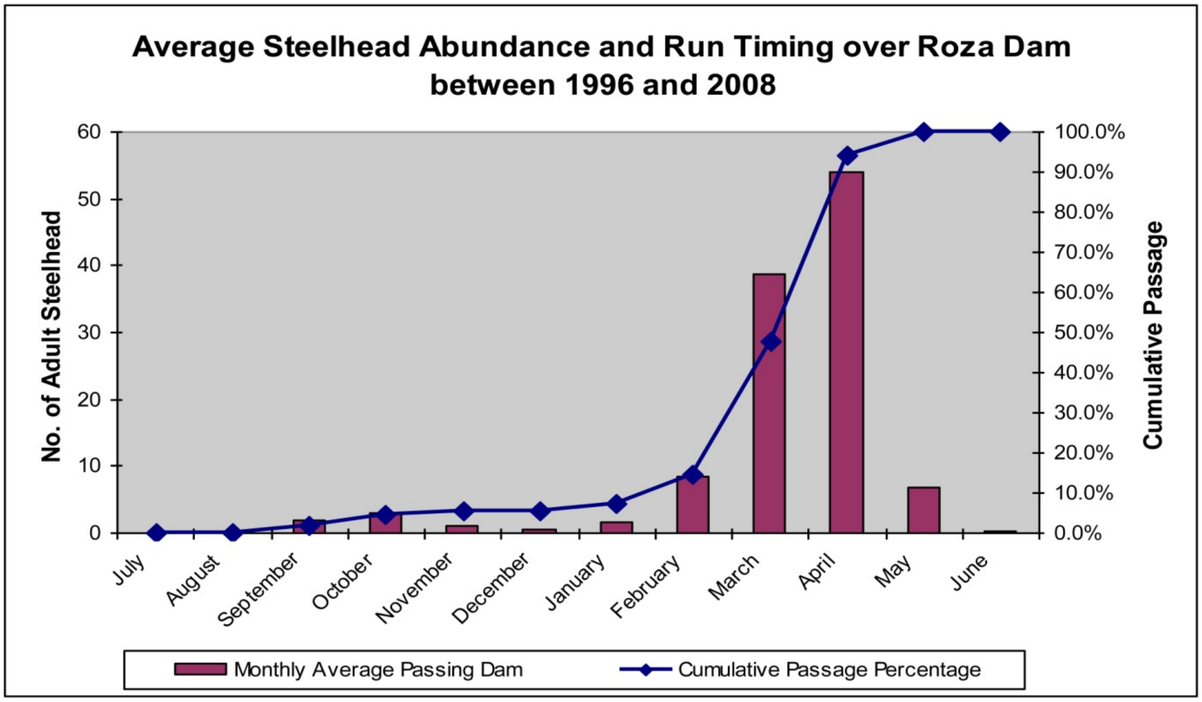

Figure 10. Average steelhead abundance by month and cumulative passage timing of steelhead passing Roza Dam between 1996 and 2008. (YKFP, 2011)

Specific information regarding steelhead distribution within the Upper Yakima River has not been well understood despite the early radio tracking work of Hockersmith et al. (1995). However, the recent steelhead radio-tracking studies in the Upper Yakima River basin (above Roza Dam) that were conducted by Reclamation and the Yakama Nation between 2002 and 2006, have provided detailed information on the distribution patterns of adult steelhead in the Upper Yakima River basin (Reclamation, 2003; Reclamation, 2009). These recently completed studies indicate that steelhead are migrating to and spawning in the Yakima River mainstem as well as in several major tributary systems of the Upper Yakima River (Reclamation, 2009).

Between 2002 and 2006, 351 wild adult steelhead were tagged with Lotek Inc., radio tags and subsequently tracked to their presumed spawning location within the Upper Yakima basin (Reclamation, 2009). Of these, the majority (98.3 percent) moved upstream following release, and 62 percent of those fish moved into tributaries to spawn (Table 2). Upper Yakima River steelhead primarily migrated into the Teanaway River, Swauk and Taneum Creek watersheds, and the mainstem Yakima River between Roza Pool and Easton Dam during the spawning season. The lower Cle Elum River, Umtanum Creek, Naches River, and Wilson-Cherry Creek watersheds were used less frequently by radio-tagged steelhead (Table 2).

Table 2. Summary of wild steelhead movements for 351 steelhead tagged at Roza Dam and tracked to upstream locations between 2002 and 2006

Location of Upstream Migration and Presumed Steelhead Spawning	Number of Radio-tagged Steelhead
Mainstem Yakima River	133 (38.2%)
Total Mainstem Spawning	**133 (38.2%)**
Teanaway River	137 (38.8%)
Swauk Creek	46 (13.0%)
Taneum Creek	17 (4.8%)
Cle Elum River	12 (3.4%)
Lower Naches River, Umtanum Creek, Cherry/Wilson/Naneum Creeks	6 (1.7%)
Total Tributary Spawning	**218 (61.8%)**

Of all 351 adult steelhead tagged during the 4-year radio-tracking study, 133 (38.2 percent) were tracked to mainstem Yakima River spawning areas. The percentage of tagged fish that used mainstem reaches varied from 34 to 45 percent in any specific year. Although steelhead use of the mainstem Yakima River was concentrated between Umtanum Creek (RM 139.8) and the confluence with the Cle Elum River (RM 186.5), steelhead were observed using all mainstem areas from Roza Dam to approximately Easton Dam (RM 202.5). The upper extent of steelhead migration in the Yakima River was observed to be as far upstream as the base of Easton Dam where at least three steelhead were tracked during 3 years of the study. However, it was uncertain if these fish ascended the ladder and moved farther upstream to spawn or reached the fish ladder and moved downstream shortly thereafter. It appears from both radio-tracking information as well as Easton Fish Ladder video and acoustic counts (VAKI Counter) that steelhead do not routinely migrate to habitat areas above Easton Dam (Reclamation, 2009; Hiebert, 2006).

Presumed and observed tributary spawning areas in the Upper Yakima River basin included the Teanaway drainage (mainstem and all three forks), Swauk Creek, Taneum Creek, lower Cle Elum River, Umtanum Creek, and the Wilson Creek, Cherry Creek, and Naneum Creek systems near Ellensburg. Additionally, a few fish (4 individuals) left the Upper Yakima basin after being radio-tagged at Roza Dam. These fish moved downstream following release and were tracked to a location about 5 miles into the lower Naches River and into Cowiche Creek, a Naches River tributary.

The Teanaway River system and Swauk Creek were the most consistently used tributary spawning areas as indicated by the radio-tracking study (Reclamation, 2008). For example, the Teanaway River drainage was the most heavily used tributary during the spawning season and was the destination of approximately 39 percent of all fish radio-tagged at Roza Dam over the entire 4-year steelhead tracking study (Table 2). Tagged fish were found as far as 20 miles upstream in the North Fork Teanaway River, including 1 mile up Stafford, Standup, and Jack Creeks; and at least 5 miles upstream in both the Middle and West Forks of the Teanaway River. At least 20 radio-tagged, male-female pairs were located throughout the system, including one pair in the West Fork Teanaway River.

Forty-six steelhead (13 percent of all tagged fish) used the Swauk Creek system, moving upstream at least 20 miles to the Swauk Creek campground. Steelhead were observed using both First and Williams Creeks in the Swauk Creek drainage and migrating at least 1 mile up each tributary. A total of 17 adult steelhead used Taneum Creek, some moving upstream at least to the Taneum Creek campground at RM 9.0. Most (82.4 percent) ascended the Bruton Diversion Dam fish ladder (about 1.6 miles) and more than half of these moved above the Taneum (RM 2.4) and Knudsen Diversions (RM 3.0). Three male-female pairings of steelhead were observed together in the middle and upper reaches as a result of the radio-tracking study (Reclamation, 2008).

Finally, at least 12 wild steelhead were radio-tracked into the lower few miles of the Cle Elum River—two fish moved at least 4 miles into Umtanum Creek, three moved about 2 miles into the Wilson Creek drainage (including Naneum and Cherry Creeks), and four fish radio-tagged at Roza Dam moved downstream following release and were tracked to a location about 5 miles into the lower Naches River and into Cowiche Creek, a Naches River tributary.

Manastash Creek Fish Populations and Habitat Conditions

Manastash Creek is a right (south) bank tributary to the Yakima River at RM 154.5. Manastash Creek drains a watershed of 97 square miles ranging in elevations from 2,000 to 5,500 feet (Figure 11). The creek originates from the North Fork and the South Fork branches of Manastash Creek, with approximately 25 miles of stream habitat in the upper watershed. Once the North and South Forks join together, the creek is moderately confined within a narrow canyon until reaching a large, open alluvial plain sloping toward the Yakima River. It is primarily snowmelt fed, with the largest flows occurring in spring and early summer (Montgomery and McDonald, 2002). The forested upper watershed is mostly public land and supports good quality habitat.

The Manastash Creek floodplain and vicinity were developed for irrigated agriculture from 1871 through the early 1900s. Diversion dams were constructed in the creek channel, eliminating fish passage. Creek water was fully appropriated for the irrigation of agricultural crops, which dewatered the stream during late spring and summer. Typical of a snowmelt-fed system, streamflow in Manastash Creek typically peaks in late April and early May (Figure 12). It begins to decrease in late May to the point that not all irrigation water rights can be satisfied. Typically, by early to mid-June, there is only enough water in Manastash Creek to meet the most senior irrigation water rights.

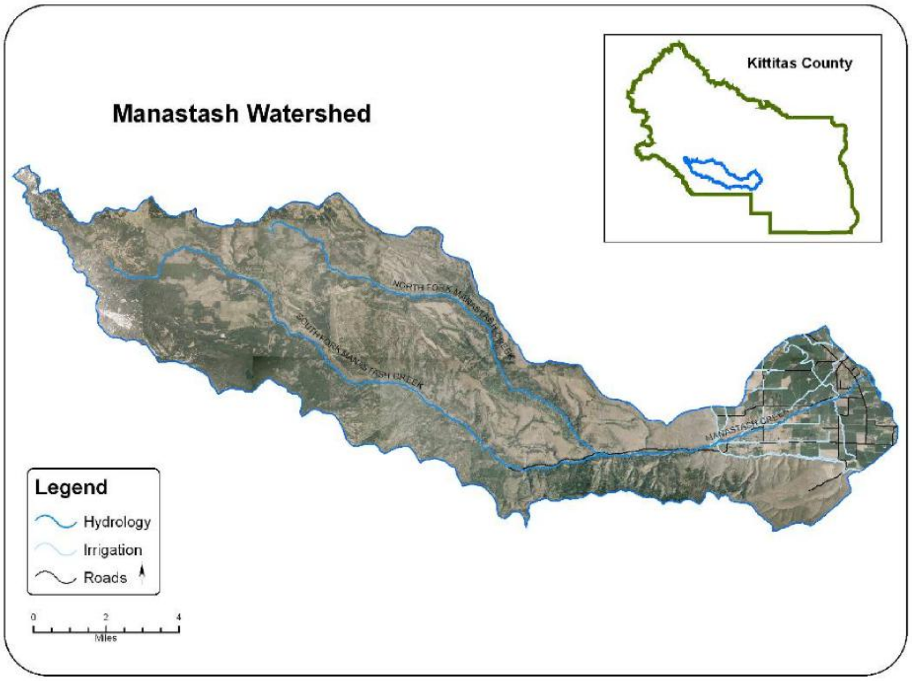

Figure 11. Manastash Creek Watershed.

Figure 12. Mean monthly unregulated streamflow data for Manastash Creek, along with maximum and minimum mean monthly flows for the period May 17, 2005, through May 30, 2009, for each month data was available. Data is provisional, courtesy of Washington State Department of Ecology (https://fortress.wa.gov/ecy/wrx/wrx/flows/station.asp?sta=39J090#block2)

The fishery resources in Manastash Creek have been significantly impacted by irrigation development, and habitat has been inaccessible for all anadromous species. At present, a 3.2-mile reach of lower Manastash Creek is seasonally dewatered by irrigation water withdrawals. Fish kills have been documented in the dewatered reach, and flow issues are known to reduce juvenile rearing capacity.

The *Yakima Basin Steelhead Recovery Plan* (YBFWRB, 2009) identifies Manastash Creek as a key tributary for restoring passage in order to achieve steelhead recovery. The Recovery Plan states that the resolution of flow and passage issues in this watershed is a high priority for the Yakima basin as a whole, due to the quantity of suitable but unoccupied habitat in Manastash Creek. If fish passage and dewatering issues are properly addressed, Manastash Creek has the potential to be a productive watershed for the fishery resources of the Yakima River basin while also continuing to be a productive area of irrigated agriculture.

Reclamation's Yakima Project was designed in the early part of the 20th century to modify the existing natural storage and topography of the basin, along with the irrigation delivery systems of the time to maximize the storage and distribution of irrigation water to lands in the basin which were suitable for agriculture (such as the KRD South Branch Canal). This construction has resulted in the Yakima basin being one of the most productive agricultural regions in the United States and the world. However, the infrastructure of the Project, as well as smaller public and private water diversions, were primarily designed without consideration for the maintenance or support of the existing resident and anadromous fishery resources in the basin. This infrastructure has also resulted in changes in access to habitat, changes in the hydrology of the tributaries and mainstem, changes in sediment energy and routing, and direct mortality through diversion. In many areas of the basin, tributaries have been entirely converted to irrigation distribution systems. There have been many efforts to lessen the impact of this infrastructure on the fishery resource—improved screening, improvements in water use efficiency, reconstruction for improved or restored passage—but fundamentally, the infrastructure itself has remained in place, expanded over time, and still remains a major threat to viability of listed species. Changes in the configuration of infrastructure—the function and location of storage dams, delivery and return points for irrigation water conveyance, delivery, and routing of water—are required to reduce this threat (YBFWRB, 2009).

A number of tributaries to the Upper Yakima River, including Manastash Creek, historically supported steelhead, but impassable dams, dry reaches below dams, and unscreened diversions have eliminated steelhead and bull trout from many of these tributaries. In many cases (e.g., Taneum, Manastash, and Naneum Creeks), the forested habitats above the agricultural zone support very good habitat that is at least partly inaccessible to steelhead, and even less accessible to bull trout due to their later spawning migration timing (YBFWRB, 2009). Currently, Manastash Creek supports spring Chinook salmon, steelhead trout (*O. mykiss*), and likely supports juvenile coho (*O. kisutch*) rearing in the lowest reaches, as well as other resident salmonids and nonsalmonids throughout the watershed (WDFW, 1998; 2012a; 2012b). Steelhead use of the Manastash Creek is primarily restricted to the lowest reach and typically only by rearing juveniles (WDFW, 2011). Resident salmonids include cutthroat trout (*O. clarki*), rainbow trout (*O. mykiss*), and brook trout (*Salvelinus confluentus*). Bull trout use of the Manastash Creek drainage has not been documented. Bull trout use within the lower reaches of Manastash Creek is considered extremely unlikely given the poor habitat conditions and numerous barriers to migration. Even the upper watershed, which contains more suitable habitat for bull trout, has been evaluated on several occasions for bull trout presence and bull trout were undetected.

Yakima River Basin Steelhead Critical Habitat

The final rule designating critical habitat for 12 ESUs of west coast salmon and steelhead in Washington, Oregon, and Idaho was published in the Federal Register on September 2, 2005, and became effective on January 2, 2006 (70 Fed. Reg. 52630). This rule designated over 20,630 miles of lake, riverine, and estuarine habitat in Washington, Oregon, and Idaho, as well as approximately 2,312 miles of marine nearshore habitat in Puget Sound, Washington. Critical habitat within the MCR steelhead DPS was designated as part of this Federal Register final rule notification, including the entire mainstem Yakima River from the confluence with the Columbia River to the upstream limits of migration at storage dams or tributary headwater streams.

Critical habitat for steelhead in the Yakima River and in Manastash Creek consists of primary constituent elements (PCEs) that support steelhead spawning, freshwater rearing, and migration habitat (NMFS, 2004; 70 Fed. Reg. 52630). Critical habitat in Manastash Creek was designated from the Creek mouth to the confluence of the North and South Forks. NMFS has determined that critical habitat PCEs exist in the Upper Yakima and Naches Rivers as well as several tributaries (including Manastash Creek) and that these PCEs are currently providing an acceptable level of protection that will contribute to the conservation of steelhead populations in this area (NMFS, 2004). Despite the altered flow regime in the Yakima River, presence of several diversion dams, and lack of general channel structure and stream complexity in the mainstem Yakima River and most tributaries, it is believed that streamflows and habitat conditions in the Yakima River currently support critical habitat PCEs for steelhead spawning, rearing, and migration.

EFFECTS DETERMINATION

Effects to Steelhead

Steelhead are known to occupy Manastash Creek up to the Reed Diversion at RM 4.8, the remaining fish passage barrier (Lael, personal communication, 2012). In 2012, a returning steelhead adult was observed jumping at the Reed Diversion. It is therefore presumed that at least one life-history stage (adult, egg, fry, juvenile, and smolt) may be present in the project vicinity. The area of direct potential impact from construction activities associated with this project is the pipeline crossing Manastash Creek. However, this section of Manastash Creek currently dewaters each year because irrigation withdrawals equal the amount of streamflow as streamflow recedes each spring. In order to avoid direct construction-related impacts to steelhead salmon, the crossing construction will be completed during the period when Manastash Creek is completely dewatered. Since Manastash Creek currently goes dry each summer, there will be no need to reroute the stream or create a bypass to work in the dry. Thus, there will be no risk to steelhead due to mechanical injury from equipment. Potential turbidity impacts will be greatly minimized by completing the work in the dry. There will be minor and short-term impacts to the streambed once the stream is watered up again in the fall. Short-term water quality impacts will include turbidity and some gravel movement associated with the first year of flows. Any potential effects will be low intensity, localized, and short-term.

The other potential impact to steelhead from construction of the pipeline crossing includes habitat changes. Potential impacts to riparian habitat will be minimized by restricting the amount riparian vegetation to the minimum amount necessary to access the site and revegetating and contouring the disturbed area when work is completed to protect the stream channel functions. The buried pipe will be designed to assure that the pipeline does not provide a pathway for groundwater nor divert surface or hyporheic water from Manastash Creek. Additionally, it will be designed and installed so that there is no potential for scouring events to expose the pipeline. Finally, no further restriction of stream channel movement will occur as part of this project.

While there are expected to be some discountable short-term construction-related impacts from this project, the long-term impacts from this project will be beneficial. The 13.8 Lateral Pipeline project will directly result in an estimated annual water-savings of 1,300 acre-feet of water that will be placed instream by an average of 4-5 cfs to address seasonal dewatering issues. The concurrent construction of the Consolidated Diversion Pipeline will help enable the remaining fish passage barrier (Reed Diversion Dam) to be removed at a future point and will also result in water savings that will be placed in Manastash Creek. Together, these actions will provide a more reliable and higher base instream flow in Manastash Creek and extend the duration of instream flow within the seasonally dewatered reach. The longer term benefits to steelhead salmon are expected to be improved migration and rearing conditions along Manastash Creek.

Due to the combination of discountable, near-term construction impacts and long-term beneficial effects, **Reclamation has determined that the project may affect, but is not likely to adversely affect, steelhead in Manastash Creek**.

Effects to Steelhead Critical Habitat

Freshwater spawning, freshwater rearing, and migration PCEs have been identified for critical habitat associated with the proposed project. Effects to these PCEs can be characterized as short-term construction impacts or longer term impacts that will persist beyond construction. Short-term construction impacts are the ones that have the most potential to be detrimental to steelhead critical habitat; however, significant steps have been taken to ensure that these impacts are discountable. These steps include conducting all construction related to the pipeline creek crossing when Manastash currently dewaters, minimizing the amount of riparian vegetation disturbance, and designing the pipeline crossing so that there is no negative impact on floodplain or instream complexity. Increased turbidity when hydrology naturally returns to the site may affect the freshwater rearing PCEs. However, these impacts will be of very low intensity, affect only a small section of Manastash Creek, and for only a short duration in time. Only a very small amount of riparian habitat will be disturbed and neither instream nor riparian habitat will be fundamentally changed.

The longer-term impacts will be beneficial to steelhead PCEs present in the project area and along other sections of Manastash Creek. Direct and incidental and interrelated effects will improve both rearing and migratory PCEs. Rearing and migratory PCEs will be improved through the addition of conserved water, benefiting both the project site and an entire 3-mile stream segment that currently dewaters. These PCEs will also be improved through the eventual removal of the Reed Diversion, which is the remaining fish passage barrier in the lower Manastash Creek. **Reclamation therefore concludes that the proposed project may affect, but is not likely to adversely affect, steelhead critical habitat in Manastash Creek.**

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