RECLAMATION
Managing Water in the West

Sunnyside Division Phase 2A Conservation Project
Final Environmental Assessment and Finding of No Significant Impact

Yakima, Washington

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region **September 2009**

Acronyms and Abbreviations

AF – Acre-Feet
APE - Area of Potential Effect
ARRA – American Reinvestment and Recovery Act
BA - Biological Assessment
cfs – Cubic Feet per Second
DPS – Distinct Population Segments
EA – Environmental Assessment
ESA – Endangered Species Act
ESU - Evolutionarily Significant Unit
FONSI - Finding of No Significant Impact
ITA - Indian Trust Asset
MAF – Million Acre-Feet
MCR - Middle Columbia River
National Register - National Register of Historic Places
NEPA – National Environmental Policy Act
NHPA - National Historic Preservation Act
NOAA-Fisheries - National Oceanographic and Atmospheric Administration-Fisheries
NRCC - National Research Council Committee
NTU - Nephelometric Turbidity Unit
PCE – Primary Constituent Elements
PEIS - Programmatic Environmental Impact Statement
Reclamation - Bureau of Reclamation
RM – River Mile
SDBOC - Sunnyside Division Board of Control
SCADA - Supervisory Control and Data Acquisition
SHPO - State Historic Preservation Office
SVID - Sunnyside Valley Irrigation District
TMDL – Total Maximum Daily Load
TSS – Total Suspended Solids
TWSA - total water supply available
USFWS – U.S. Fish and Wildlife Service
WDFW – Washington State Department of Fish and Wildlife
YRBWEP – Yakima River Basin Water Enhancement Project

FINDING OF NO SIGNIFICANT IMPACT
Sunnyside Division Phase 2A Conservation Project
PN-FONSI-09-04

Introduction

The Bureau of Reclamation (Reclamation) has prepared an Environmental Assessment (EA) for a conservation project on the Sunnyside Valley Irrigation District (SVID), within the Sunnyside Division of the Yakima Project.

The purpose of the Sunnyside conservation project is to make the Sunnyside system more efficient by implementing water conservation improvements, thereby conserving water for fish benefit. The need for the project will be met by improving the canal system in order to divert less water and provide more water for fish.

Alternatives Considered

Two alternatives were developed and evaluated in the Environmental Assessment (EA), the No Action Alternative (as required by the National Environmental Policy Act) and Alternative No, 2 - Phase 2A. Four laterals are to be piped under this alternative. The laterals will be enclosed by burying pipe either within the existing open channel lateral or along the adjacent existing canal right of way and access road. The work would be done during the non-irrigation season, mostly in the fall and winter. When completed, the four laterals will conserve approximately 1,663 AF of water annually.

The Recommended Alternative

Reclamation has selected the Alternative No.2 - Phase 2A as the recommended alternative for implementation.

Proposal

Reclamation proposes to implement the conservation project which will provide additional water for fisheries benefits.

This project consists of the following laterals being piped:

Lateral	Total Length (miles)	Acres Served	Estimated Water Conservation (AF/year)
22.56	4.2	512	284
40.86	4.3	777	430
51.36	6.0	1,194	661
59.28A	4.3	520	288
Total	**18.8 miles**	**3,003 acres**	**1,663 AF/year**

Consultation, Coordination, and Public Involvement

Formal consultation under Section 7 of the Endangered Species Act (ESA) has been initiated with the National Oceanic and Atmospheric Administration (NOAA Fisheries) to address any impacts from this conservation project. No effects are anticipated to species under the jurisdiction of the U.S. Fish and Wildlife Service.

Under the Washington State Environmental Policy Act (SEPA) the Sunnyside Valley Irrigation District (SVID), the implementing entity for this project, issued an environmental evaluation for public comment. The project described in that evaluation was Alternative No. 2 – Phase 2A. The SEPA evaluation was issued on July 10, 2009 and had a 14 day public comment period.

Summary of Review Comments and Reclamations Responses

SVID received one letter of comment on their SEPA document that evaluated the impacts of Alternative No. 2 – Phase 2A. The comment was from Washington State Department of Ecology and pertained to obtaining a stormwater permit for construction activities. That comment was shared by SVID with Reclamation while the EA was being developed. SVID has committed to acquiring the necessary stormwater permits.

Findings

This Finding of No Significant Impact (FONSI) is based upon the following:

- Impacts to listed fish would be beneficial since less water will be diverted for irrigation and more available for fish.
- No negative impacts to terrestrial species, wetlands, or T & E species were identified in the EA.
- No significant impacts were identified by the public or other government agencies during the SEPA process.
- Cumulative impacts were previously addressed in the Programmatic Environmental Impact Statement prepared for the Yakima River Basin Water Enhancement Project conservation program and nothing has changed that would alter the analysis done then.

Based on the environmental analysis as presented in the final EA, Reclamation concludes that implementation of preferred action and associated environmental commitments would have no significant impact on the quality of the human environment or the natural resources in the affected area.

This Finding of No Significant Impact has therefore been prepared and submitted to document environmental review and evaluation in compliance with the National Environmental Policy Act of 1969, as amended.

RECOMMENDED:

Columbia-Cascades Area Environmental Manager — Date: 9-4-09

APPROVED:

Columbia-Cascades Office Area Manager — Date: 9/4/09

Sunnyside Division Phase 2A Conservation Project
Environmental Assessment

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1. PURPOSE AND NEED

1.0 Introduction

The Sunnyside Division Board of Control (SDBOC) has proposed to replace open canals and laterals with pipe in order to conserve water and operate their canal system in a more efficient manner. In the 1990's, conservation program efforts were expanded with Reclamation's Yakima River Basin Water Enhancement Project's (YRBWEP) Basin Conservation Program (BCP). As a result, Yakima basin irrigation districts prepared Water Conservation Plans and performed Feasibility Studies, cost estimates, and estimate amounts of water conservation savings possible as a result of proposed conservation measures.

The SDBOC is a voluntary participant in the YRBWEP BCP. In 1998, they completed a Water Conservation Plan and a Conservation Plan Feasibility Study (Feasibility Study) in 2000 (UMA 2000). The conservation plan and Feasibility Study were designed to make the Sunnyside Main Canal irrigation system more efficient, and also use water more efficiently for fishery benefits. The SDBOC's goal has been to improve the canal and water delivery system through water conservation improvements. Therefore, allowing less water to be diverted from the Yakima River and allowing more water available for fish habitat and irrigation supply in the lower basin.

In the early to mid 2000's, the SDBOC began to implement conservation measures that were outlined in the Water Conservation Plan and Feasibility Study. In 2004, Phase 1 of the Plan was initiated and consisted of the construction of 3 re-regulation reservoirs on the Sunnyside Main Canal, replacement of 30 canal check or drop structures, installation of a chute drop spillway at Spring Creek and installation of a Supervisory Control and Data Acquisition (SCADA) automation system. Phase 1 will result in a total of 29,162 acre-feet of net water conservation savings. Two-thirds of this water (or 19,442 acre-feet) will not be diverted into the Sunnyside Canal and will be left instream to enhance instream flows in the Yakima River downstream of Sunnyside Dam (RM 103.8). The instream flow benefit from the conservation measures equates to a 54 cfs increase in instream target flows during the entire 180-day irrigation season in the mainstem Yakima River each year.

The Sunnyside Division has begun the planning and design process to initiate Phase 2 of the Water Conservation Plan. It consists of further system efficiency improvements involving the conversion of select open laterals and sub-laterals to fully enclosed pipeline delivery systems

1.1 Purpose and Need for Action

The purpose of Phase 2 of the Sunnyside Division Water Conservation Plan, is to convert open irrigation ditches, pipes, and weir boxes to enclosed laterals with in-line flow meters. The need is to improve on farm control of irrigation water, reduce lateral losses, improve irrigation drain water quality, and reduce operation and maintenance costs. The action covered by this EA is the piping of the first 4 laterals to be done as part of Phase 2.

1.2 Location and General Description of Area

The Sunnyside Division is located in south-central Washington near Yakima, Washington in Yakima County (See locator map). The Sunnyside Division consists of some 99,000 acres of land lying mostly north of the Yakima River, and extends from the Sunnyside Diversion Dam, on the Yakima River near Parker, to the vicinity of Benton City. Water is diverted from the Yakima River at the Sunnyside Diversion Dam and flows generally southeast through the Sunnyside Canal, which supplies the distribution system of the division. Four irrigation districts in the Sunnyside Division pump water to their lands by hydraulic turbine pumps at drops on the Sunnyside Canal.

The lower Yakima River Basin has a semi-arid climate with dry, warm summers and moderately cold winters. Average precipitation for the area is 8 inches per year, about half of which is snowfall. This climate supports shrub-steppe plant communities in the undisturbed area and topography is gently rolling.

By virtue of long standing water rights and contractual agreements with Reclamation's Yakima Project, the Sunnyside Division diverts and supplies Yakima River water to about 99,000 acres of irrigated lands in the lower Yakima Valley.

The Yakima Project area, which includes the Sunnyside Division, is among the leading agricultural areas in the United States. It is or has ranked first in the United States in producing several crops. It is also a major center for producing beef cattle. Yakima County ranked fifth in the United States in total agricultural production.

The Sunnyside Canal is the main canal for conveying water to lands within the Sunnyside Division. The Sunnyside Canal extends over 60 miles eastward from the Sunnyside Diversion Dam near Parker to lands northeast of Prosser and generally serves lands north and east of the Yakima River, but also includes land south of the river in the vicinity of the communities of Mabton and Prosser. The canal has a capacity of 1,317 cfs. Along with the water distribution system, a network of drains and wasteways was needed to convey irrigation return flows back to the Yakima River from the Sunnyside Canal delivery system.

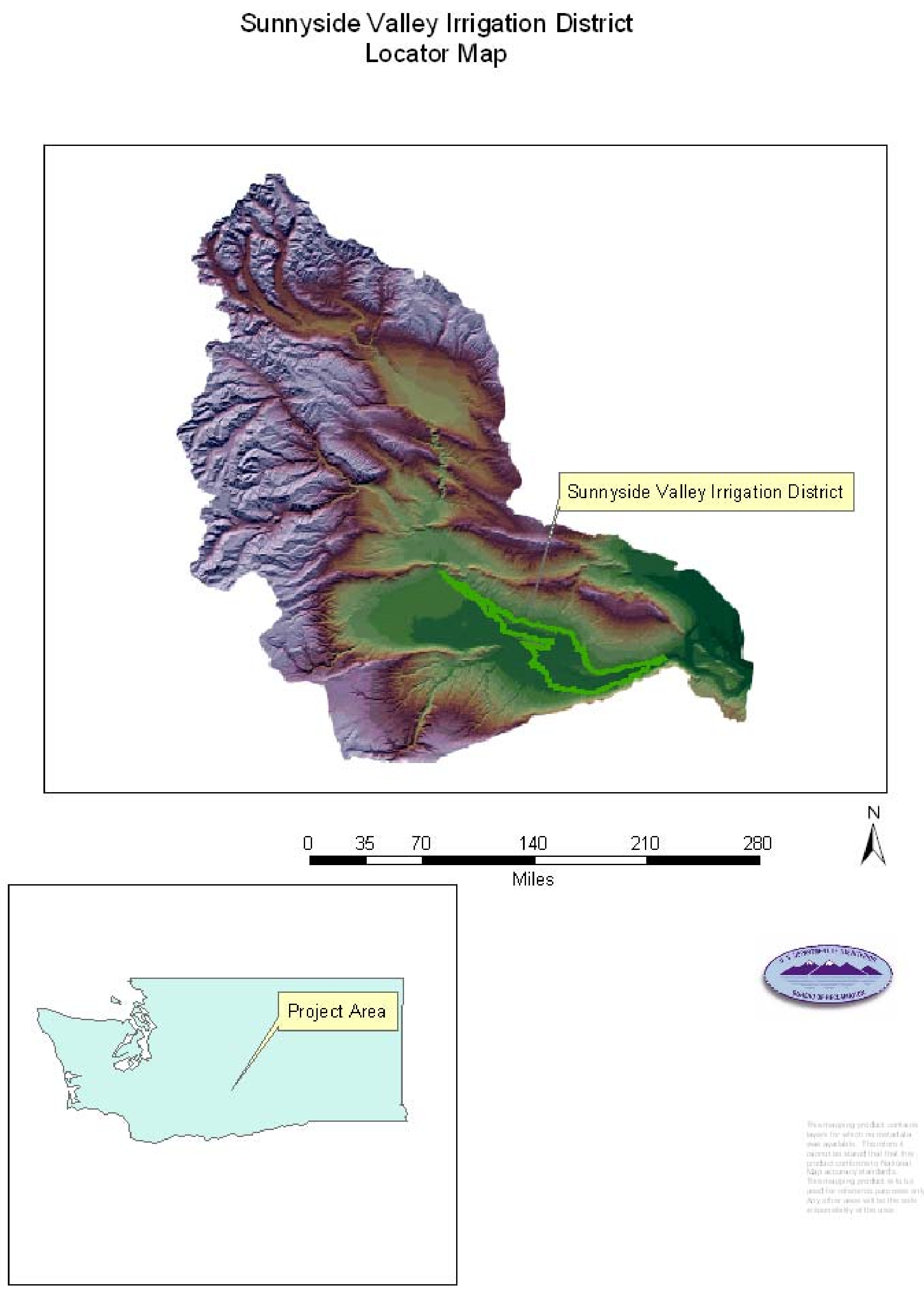

Figure 1-1. Project Location Map

1.3 Project History and Background

The Sunnyside Division dates back to 1890 when the Northern Pacific Railroad began construction of the Sunnyside Canal. The United States Bureau of Reclamation (then known as the United States Reclamation Service) purchased the Sunnyside Canal in 1905 and by 1923 completed the project. On March 10, 1906, the Sunnyside Water Users Association formed to provide a liaison between the federal government and the landowners. On January 22, 1917, the Sunnyside Valley Irrigation District (SVID) replaced the Sunnyside Water Users Association. Reclamation operated the Sunnyside Division until 1945. Beginning with the 1946 irrigation season, the Sunnyside Division has operated and maintained its facilities. The Sunnyside Division receives water through works constructed under the auspices of the Yakima Reclamation Project, administered by Reclamation. The origin of the Sunnyside Canal dates back to 1878 when the Konnewock Ditch was constructed with a point of diversion about 400 feet upstream of the Sunnyside Diversion Dam. In 1880 the Konnewock Ditch Company was formed and 35 cfs of water were diverted from the Yakima River to irrigate about 3,500 acres. Initial construction of the Sunnyside Canal began in 1890. Several irrigation projects were undertaken during this time period. In 1900 the Sunnyside Canal was purchased by the Washington Irrigation Company, and then later sold to the United States Reclamation Service in 1905.

The various entities that receive water from the Sunnyside Canal and make up Sunnyside Division include: Grandview Irrigation District, Benton Irrigation District, Sunnyside Valley Irrigation District, Piety Flat Ditch Company, Konnewock Water Users, Zillah Irrigation District, City of Sunnyside, City of Grandview, and City of Prosser. In 1945, a Board of Control was established by contract between Reclamation and each of these entities. The selected operating agent for the Sunnyside Division Board of Joint Control is SVID, which provides operation and maintenance of the joint use and ancillary facilities. In 1958, SVID entered into a contract with Reclamation to construct a system of drain channels. Upon completion of construction, operation and maintenance of the drains was transferred to the Sunnyside Division, with SVID serving as the operating agent.

1.4 Water Source and Rights

The water supply source for the Sunnyside Division is the Yakima River. The Yakima has an average annual runoff of approximately 3.4 million AF. It has been a partially regulated river since completion of the storage reservoir system by Reclamation in 1933. The reservoirs are reported to have a combined storage capacity of 1.07 million AF.

To meet the contract obligations to deliver water and to supply claimed rights, Reclamation distributes water to the various users under the concept of total water supply available (TWSA). TWSA is the amount of water available in any year from natural flow of the Yakima River and tributaries, from storage in the various Yakima Project reservoirs, from return and from other sources. Each year the Reclamation forecast for the TWSA consists of:

- April 1 to July 31 forecast of runoff

- Plus the August to September projected runoff

- Plus the April 1 reservoir storage contents

- Plus the usable return flow above Parker

Through operating experience, Reclamation has determined that when the April 1 to September 30 TWSA forecast is less than 2.25 million AF, water shortages for irrigation are likely to occur. Under terms of a Federal Court judgment, known locally as the 1945 Consent Decree, proration of supply for junior water users takes place during years of water shortage. This proration applies during the period when storage must be released from the reservoirs to meet entitlements (storage control period). Over the past 70 years of record, the average date for starting storage control is June 24.

The water rights of all entities claiming water from the Yakima River Basin are pending final determination in the ongoing general adjudication of water rights (filed in 1977 in the Superior Court of Yakima County). The case is State of Washington, Department of Ecology vs James J. Acquavella, et. al. No. 77-2-01484-5).

The water rights comprising the Sunnyside Division are set forth in the "Sunnyside Division Water Right Settlement Agreement" as a part of the Washington State Department of Ecology v. Acquavella adjudication. Priority dates for those water rights are as follows:

June 29, 1878
June 30, 1878
September 3, 1890
July 18, 1893
May 9, 1905
May 10, 1905

The point of diversion for Sunnyside's canal system is the Sunnyside Diversion Dam located 1500 feet west and 130 feet south from the east quarter corner of Section 28, T12N, R19E, W.M.

1.5 Related Actions

In 2004, the SDBOC initiated Phase 1 of the Water Conservation Plan which consisted of the construction of 3 re-regulation reservoirs on the Sunnyside Main Canal, replacement of 28 canal check or drop structures along the canal's 60 mile alignment, and installation of a Supervisory Control and Data Acquisition (SCADA) automation system. Phase 1 is currently underway and will be completed by the year 2014. When complete, Phase 1 will result in a total of 29,162 acre-feet of net water conservation savings. Two-thirds of this water (or 19,442 acre-feet) will not be diverted but rather left instream to enhance instream flows in the Yakima River downstream of Sunnyside Dam (RM 103.8).

A Programmatic Environmental Impact Statement (PEIS) was completed in January, 1999 for YRBWEP (Reclamation, 1999). This Environmental Assessment (EA), where appropriate, will tier sections of the PEIS. Section 1508.28 of the National Environmental Policy Act (NEPA) defines tiering of NEPA documents as "coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basin-wide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared." This PEIS is available for review at the Columbia-Cascades Area Office.

1.6 Related Laws

Yakima River Basin Water Enhancement Project

Congress enacted the YRBWEP, Title XII of Public Law 103-434, on October 31, 1994. Title XII of Public Law 103-434 authorized the Secretary of Interior, acting through Reclamation, to establish and administer the Yakima River Basin Water Conservation Program, in consultation with the State of Washington, the Yakama Nation, the Yakima River basin irrigators, and other interested parties. Title XII is considered to be Phase II of the YRBWEP. The goal of this program is "to realize sufficient reductions in irrigation water diversions through implementation of water conservation measures so that additional water is available for instream flows for fish and wildlife and the water supplies for irrigation in dry years are improved."(Yakima River Basin Conservation Advisory Group, 1998.)

The purposes of Title XII are:

> (1) to protect, mitigate, and enhance fish and wildlife through improved water management; improved instream flows; improved water quality; protection, creation and enhancement of wetlands; and by other appropriate means of habitat improvement;
>
> (2) to improve the reliability of water supply for irrigation;
>
> (3) to authorize a Yakima River Basin Water Conservation Program that will improve the efficiency of water delivery and use; enhance basin water supplies; improve water quality; protect, create and enhance wetlands; and determine the amount of basin water needs that can be met by water conservation measures;
>
> (4) to realize sufficient water savings from the Yakima River Water Conservation Program so that not less than 40,000 acre-feet (AF) of water savings per year are achieved by the end of the fourth year [1998] of the Basin Conservation Program, and not less than 110,000 AF of water savings per year are achieved by the end of the eighth year [2002] of the program, to protect and enhance fish and wildlife resources; and not less than 55,000 AF of water saving per year are achieved by the end of the eighth year [2002] of the program for availability for irrigation;
>
> (5) to encourage voluntary transactions among public and private entities which result in the implementation of water conservation measures, practices, and facilities; and
>
> (6) to provide for the implementation by the Yakama Nation at its sole discretion of (A) an irrigation demonstration project on the Yakama Reservation using water savings from

system improvements to the Wapato Irrigation Project, and (B) a Toppenish Creek corridor enhancement project integrating agricultural, fish, wildlife and culture resources.

American Recovery and Reinvestment Act

Congressional authorization of funding through the recent passage of the American Recovery and Reinvestment Act (ARRA) legislation has been made available for projects that can be implemented over the course of 2 fiscal years (FY10 – FY11) ending September 30, 2011. Under the ARRA legislation over 21 million dollars will be help fund a portion of the Sunnyside Division Phase 2 Water Conservation Plan. As a condition of ARRA funding, "stimulus package" project funds for the Phase 2 must be appropriated and completely expended prior to September 30, 2011. As a result, the implementation schedule for the Phase 2 Water Conservation Plan has been accelerated to comply with these funding and expenditure requirements.

National Environmental Policy Act

Reclamation is responsible for determining if the proposed project might have significant effects to the environment under the National Environmental Policy Act (NEPA). If Reclamation determines that effects are not significant, a Finding of No Significant Impact (FONSI) will be prepared. A FONSI would allow Reclamation to proceed with the proposed action without preparation of an Environmental Impact Statement.

Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Section 7 of the ESA (16 U.S.C. Section 1536[a][2]), requires all federal agencies to consult with the National Oceanic and Atmospheric Administration-Fisheries (NOAA-Fisheries) for marine and anadromous species, or the United States Fish and Wildlife Services (USFWS) for fresh-water and wildlife species, if an agency is proposing an "action" that may affect listed species or their designated habitat. If such species may be present, the federal agency must conduct a biological assessment (BA) for the purpose of analyzing the potential effects of the project on listed species and critical habitat in order to establish and justify an effect determination.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966 (16 USC 470, PL 95-515) requires that federal agencies complete inventories and site evaluation actions to identify historic resources that may be eligible to the National Register of Historic Places (National Register), and then ensure those resources “are not inadvertently transferred, sold, demolished, substantially altered, or allowed to deteriorate significantly.” Regulations entitled “Protection of Historic Properties” (36 CFR 800) define the process for implementing requirements of the NHPA, including consultation with the appropriate State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation.

2. ALTERNATIVES

2.1 Alternative No. 1 – No Action

The No Action Alternative assumes that the Sunnyside Division will not implement Phase 2 of the Water Conservation Plan. Sunnyside Division will continue with Phase 1 of the Water Conservation Plan, initiated in 2004, that consists of the construction of 3 re-regulation reservoirs, replacement of 28 canal check structures, and the installation of a SCADA automation system.

By not constructing an enclosed pipeline, under Phase 2, the open delivery system will continue to experience evaporation and seepage losses. Therefore causing continued impacts to farm control of irrigation water, water quality, and operation and maintenance costs.

The water savings from this portion of the Phase 2 will not be achieve through the elimination or reduction in evaporation and seepage losses through the newly enclosed pipeline delivery systems. Also, there would be no water savings from conservation measures that would transfer to instream flow improvements in the mainstem Yakima River.

2.2 Alternative No. 2 – Phase 2A

Under Alternative 2, four open laterals (22.56, 40.86, 51.36, 59.28A) will be piped. The laterals will be enclosed by burying pipe either within the existing open channel lateral or along the adjacent existing canal right of way and access road. The work would be done during the non-irrigation season, mostly in the fall and winter. Pipeline sizes will range from 4 inches to 36 inches in diameter for each of the lateral systems. When completed, the four laterals will conserve approximately 1,663 AF of water annually. Table 2-1 identifies the laterals along with pertinent information about each lateral.

Under Title XII, districts that conserve water may keep one-third of that water for their use and two-thirds remains in the river for fisheries. In this case, 1,110 AF will stay in the river and the rest can be utilized by SVID.

Table 2-1. Lateral Number, Total Length, Acres Served, and estimated water conservation benefits (AF conserved) for laterals proposed for conversion to pipeline distribution systems using the ARRA stimulus funding over the next 2 fiscal years within the Sunnyside Division. (Data from UMA 2000 and Don Schramm, SVID, personal communication, 2009).

Lateral	Total Length (miles)	Acres Served	Estimated Water Conservation (AF/year)
22.56	4.2	512	284
40.86	4.3	777	430
51.36	6.0	1,194	661
59.28A	4.3	520	288
Total	**18.8 miles**	**3,003 acres**	**1,663 AF/year**

3. AFFECTED ENVIRONMENT

This chapter describes resources in the study area that may be affected by the alternative implemented. Resources and related topics presented include surface water hydrology, groundwater hydrology, water quality, fisheries, vegetation and wildlife, threatened and endangered species, economics, historic properties, Indian Trust Assets (ITA), environmental justice, and wetlands.

Issues Considered but Eliminated from Further Analysis

Recreation was analyzed in the YRBWEP PEIS and no impacts were found, therefore it is not discussed here. For this document, vegetation is discussed as a wetlands impact and will be addressed in that section.

3.1 Fisheries

The Pacific salmon species produced in the Yakima River Basin include steelhead, spring chinook salmon, fall chinook salmon, and coho salmon. These fish spawn and rear within the basin, migrate to the ocean to grow to adult size, and return to the Yakima system to spawn. Each species uses specific areas within the basin for its respective life stages. This discussion focuses on those aspects of salmon and steelhead migration, spawning, and rearing that could be affected by changes in instream flows, river operations, or water quality as a result of this proposed project. It focuses on the reach of the Yakima River from Parker to about Kiona and changes to flows and water quality during the irrigation season from March through October.

The river below Prosser Dam is important for fall chinook spawning, migration, and rearing. The reach below Sunnyside Dam is used by spring chinook and steelhead for juvenile rearing, primarily in the fall and winter when temperatures are suitable or in areas of upwelling groundwater or cooler tributary inflow. Fall chinook spawning and rearing also occurs in this reach. Adult upstream and juvenile downstream migration of all species occurs from Sunnyside Diversion Dam to the mouth of the Yakima River.

3.1.1 Fall Chinook

Adult Migration – The spawning run of Yakima River fall chinook at Prosser begins in early September, peaks in late September and is usually finished by the second week of November. Run timing variability is related to flow but not water temperature; higher flows accelerate passage (NPPC 2001).

Spawning and Incubation – Spawning begins immediately after arrival of adults in early October and is complete by the end of November. In the lower mainstem some spawning occurs later from late December to early January. It is estimated that about 70 percent of fall chinook spawning occurs below Prosser Diversion Dam. Incubation occurs from mid October through April.

Emergence and Rearing – The emergence period ranges from mid February to late April with a peak in late February to early March. Emergence occurs earliest in the Marion Drain (RM 82.6), ranging from mid-February to late March. In the cooler mainstem, emergence doesn't begin until late March, extending into the third week of April (NPPC 2001).

Fry Colonization – Fry colonization begins March 1 and extends through May 31. Fry rearing above Prosser are not seen in significant numbers at the juvenile bypass facilities at Prosser until smolts are observed in the last week of April or first week in May (Fast et al. 1986).

Smolt Outmigration – All fall chinook outmigrate as subyearlings. Ten percent of the smolts have passed Prosser Diversion Dam by May 9; 50 percent by June 6 and 90 percent by July 1. There is considerable variability in outmigration timing, with the migration ending as late as July 15.

3.1.2 Spring Chinook

Adult Migration – Adult migration into the Yakima River begins in late April (the earliest observation was April 11) continuing through late June. Cumulative passage of spring chinook spawning run at Prosser Diversion Dam for 1983 through 2000 indicates the dates of 10, 50 and 90 percent cumulative passage are April 10, May 13 and June 3. There is considerable variability from year to year, as the run has been 90 percent complete as early as May and as late as June 24.

Spawning and Incubation – Spring chinook do not spawn in the reaches potentially affected by this proposed action.

Fry Colonization and Overwintering –Highest juvenile densities in summer are found well below the major spawning areas in the upper parts of the Yakima basin but above Sunnyside Dam. No juveniles are found in the lower Yakima mainstem below Sunnyside because of excessive summertime water temperatures (Fast et al. 1991). An extensive downstream winter migration of pre-smolts occurs from October 1 through January 31 in response to falling water temperatures in late fall. From 10 to 35 percent of brood year juveniles migrate below Prosser Diversion Dam during winter, with the remaining juveniles overwintering in deep, low velocity portions of mainstem Yakima between Marion Drain and Prosser Diversion Dam.

Smolt Outmigration – Outmigration of smolts ranges from March through the end of June, with peaks occurring the second week of April.

3.1.3 Coho

Adult Migration – In 2002 the adult spawning run passing the counting facilities at Prosser Diversion Dam began the second week of September and continued through November (YKFP 2003).

Spawning and Incubation – Most coho spawn from early October through late December in proximity to their acclimation and release points. In the past spawning occurred in the middle

Yakima River below Sunnyside Dam (from RM 95 - RM 104) near previous hatchery release sites. Spawning also has occurred in side channels in mainstem Yakima between Rosa Dam and Wapato (~ RM 100) and in Yakima Canyon (RM 129-RM 146); in the mainstem and tributaries of the Naches River; Marion Drain, and Toppenish Creek. Spawning sites also include Spring Creek and Sulphur Creek wasteways. Incubation occurs from November 1 through March. More recently, hatchery Coho are outplanted in the upper Yakima and Naches Rivers in order for them to reestablish in more favorable conditions.

Emergence and Rearing **–** Emergence occurs from March through April. Coho juveniles rear for one year in the Yakima River, from April 1 to the following April 1. It is unknown if coho juveniles enter the mainstem of the lower Yakima River during any portion of this year-long rearing period.

Smolt Outmigration **–** In 2002, coho outmigration past Prosser Diversion Dam began March 25, peaked mid-May and was completed by mid-June (YKFP 2003).

Smolt Outmigration. Smolt outmigration in the lower Yakima River at Prosser begins in March and ends in early July (YKFP 2003).

3.1.4 Fish Populations in Snipes/Spring Creek and Sulphur Wasteways

Fish from the Yakima River are able to access some areas within the SDBOC drainage networks. None of these facilities were developed for the expressed purpose of providing fish and wildlife habitat, but animals are present and using the habitat that is available. Most often salmonid use of the irrigation network occurs in lower reaches of channels carrying return water back to the Yakima River, where there is open access for fish migrating in the upstream direction. Coho and chinook salmon and steelhead trout are present within the SDBOC drainage network and currently use select drains and wasteways for spawning and juvenile rearing. These species have been observed spawning in the drainage network for over a decade (Cuffney et al. 1997).

However, the extent of anadromous and resident fish distribution, and the seasonality of fish use of the wasteways has not been extensively studied. As a result, fish population information is limited for the system of wasteways and drains associated with the Roza and Sunnyside Canal network. Life history and abundance data pertaining to steelhead trout in these drains are particularly scarce so supplemental information for coho and chinook salmon will be used in this Biological Assessment to indicate environmental conditions for fish in the drainage network.

Spring and Snipes Creek Wasteways and Sulphur Wasteway have been the most extensively studied drainage networks associated with the SDBOC drainage network. Monk (2001) surveyed adult salmonid spawning populations and monitored juvenile production and distribution within these drainages in the most detailed study of fish use of these networks to date. Annual redd surveys for these species have also been performed in these drainage networks since 1999 (Pat Monk, SDBOC biologist, personal communication, 2006). Results of these surveys indicate that the most abundant salmonid populations in these drainages is composed of coho salmon.

Electrofishing surveys conducted in 2000 and 2001 indicated that the fish community in Sulphur Wasteway was dominated by native minnows and suckers. Very little salmonid production was observed in Sulphur Wasteway which had a reported density of only 0.07 coho fry/100 m2. Juvenile salmonids were the most abundant fish species observed in Spring and Snipes Creek Wasteways during the 2000 and 2001 surveys. Coho densities of 4.73 fry/100 m2 were observed in these drainages during the electroshocking surveys. Based on density estimates it appears that coho spawning was only marginally successful in Spring and Snipes Creek Wasteways and was extremely poor in Sulphur Wasteway (Monk 2001).

Although coho and fall chinook are the primary species utilizing these drains, steelhead are also known to use these drains and wasteways. Steelhead adults were observed in Spring and Snipes Creek Wasteways and in Sulphur Wasteway during redd surveys, but in very low numbers. One or two steelhead were observed in Sulphur Creek Wasteway on at least three occasions between February and April 2001, but spawning activity was not observed. A dead steelhead kelt was found in Sulphur Creek in June 2001 (Monk 2001). A trout redd and a spawning male rainbow trout were found in Snipes Creek Wasteway, and a rainbow/steelhead trout was seen on a redd in Spring Creek Wasteway during surveys in 2001. Additional signs of steelhead spawning activity was scarce as adult fish were not abundant in the drainages surveyed in 2001 (Monk 2001). Similar to coho salmon, very low densities of juvenile rainbow/steelhead (0.22 and 0.18 trout fry/100 m2 in Sulphur and Snipes/Spring Creeks, respectively) were observed in the drains surveyed by Monk (2001) in 2000.

High return flows that occur annually during the irrigation season and during canal shutdown in the SDBOC drainage network result in false attraction flows for adult salmonids. Salmon and steelhead that migrate into Spring/Snipes Creek and Sulphur Wasteways are allowed to spawn naturally or, in the case of Sulphur Wasteway, are removed once they reach the terminus of the drain at the anadromous barrier at RM 7.0. Some of the coho salmon have been used as broodstock for the Yakama Nation hatchery, while the surplus have been released in the Yakima River upstream of Sulphur Creek Wasteway.

The Yakama Nation has been seining and removing adults from these drains since 2000. Numbers of fish removed ranged from 47 coho and four steelhead in 2003 to 379 coho and 17 steelhead in 2006. The number of returning adult salmon into Sulphur Creek has often been a significant portion of the total adult run into the Yakima River. For example, coho salmon migrants entering Sulphur Creek in 2000 was estimated at over 600 fish (Monk 2001). The coho run in 2000 to the Yakima River was approximately 5,700 in 2000; thus over 10% of returning adults were attracted from the Yakima River to the wasteway where spawning habitat is unsuitable.

In 2007, the SDBOC and Reclamation funded the construction of an adult velocity-barrier at RM 1.0 of Sulphur Wasteway. As a result of this barrier construction, adult salmon and steelhead that enter the wasteway are prevented from migrating further into the drainage network. Fish that are stopped by the velocity barrier volitionally migrate back to the Yakima River to continue their upstream migration.

3.1.5 Fish Habitat Conditions in Sulphur Wasteway and Snipes/Spring Creek Wasteways

Anadromous fish have access to several miles of drain and wasteway habitat in the SDBOC drainage network and are only limited in their distribution by impassible culverts at road crossings or barriers created by drop structures associated with the drainage network. Sulphur Wasteway has approximately 7 miles of accessible salmonid habitat, while Spring Creek and Snipes Creeks have 0.4 and 3.8 miles of available habitat, respectively. Based on redd survey data and fish population investigations, anadromous salmonids are currently distributed in all areas downstream of anadromous barriers and use available habitat to varying degrees (Monk 2001).

A study was conducted on the SDBOC drainage network in 2001 by Romey and Cramer (2001) to characterize available habitat conditions and to determine the networks potential to support salmon and steelhead life history characteristics including; migration, spawning, egg incubation, and juvenile rearing. This study focused on Sulphur Wasteway as well as the Snipes and Spring Creek Wasteways.

Stream habitat was found to be generally unsuitable for salmonids in Sulphur Wasteway. Areas consisting of pool and riffle habitat types were scarce while less productive glide habitat dominated. High levels of fine sediment (45-80%) and highly embedded substrates (average of 64%) in the drain were indicative of a drainage channel that flowed through agricultural areas with highly erosive silt and sand deposits (Romey and Cramer 2001). The habitat survey also indicated that channel gradients were very low (0.3% to 0.4%). Romey and Cramer (2001) concluded that the low stream gradients and high sedimentation rates observed in Sulphur Wasteway would result in extremely poor spawning or egg incubation success rates for any species that spawned in this irrigation return flow channel. Negative effects from sedimentation are particularly high for fall spawning species, as sediment loads tend to drop out and settle on channel substrates when water levels decrease at the end of the irrigation season (mid-October). A readily observable layer of fine sediment accumulates and covers most substrate areas in Sulphur Wasteway during most years (Pat Monk, SDBOC biologist, personal communication).

In contrast, Romey and Cramer (2001) observed that stream habitat conditions were fair to good for natural production of salmonids in both Snipes and Spring Creek Wasteways. These natural channels had gradients around 1%, flowed through areas of basalt geology, and had suitable amounts of gravel and cobble substrates. Habitat types were dominated by highly productive riffles (44-75% by area) with large areas of suitable spawning gravels. The remainder of habitat types consisted of pool and some glides (Romey and Cramer 2001). Stream habitat was more complex and was more likely to support juvenile salmonid rearing than that observed in Sulphur Wasteway. However, substrate embeddedness and levels of fine sediment in streambed gravels were also found to be high in Snipes and Spring Creek Wasteways. Embeddedness ratings were commonly measured in the 20% to 30% range, while percent fine sediments was often reported to be between 20 and 40% in some reaches of Snipes and Spring Creeks.

Water temperatures in all drains generally remained within ranges tolerated by salmonids (Romey and Cramer 2001), although high temperatures could result in growth reduction and sub-lethal stress during the warmest periods observed in summer. During the irrigation season, temperatures reached daily averages as high as 23˚C; 21˚C is the temperature where detrimental effects will occur. Average summer temperatures are 16-21˚C in Sulphur Drain and 18-23˚C in Snipes and Spring Creeks.

3.2 Water Quality

3.2.1 Hydrology of SDBOC Drains and Wasteways

The surface water supply for the Sunnyside Division is obtained from the unregulated flow of the Yakima River and its tributaries, return flows, and stored waters from the Yakima Project's storage division. The average annual unregulated flow of the Yakima River Basin near Parker totals about 3.4 million acre-feet (MAF), and ranges from 5.6 MAF (1972) to 1.5 MAF (1977). Annual average irrigation diversion by entities in the basin totals approximately 2.2 MAF (period of record, 1961-1990). These entitlements do not include other requirements for water in the basin, including instream flow, hydroelectric generation, and municipal and industrial uses. The five major reservoirs that comprise the Yakima Project's Storage Division provide most of the capacity to store and release water to meet Yakima Project purposes. Total storage capacity of the five reservoirs equals 1.07 MAF.

Annual regulated runoff in the Yakima River in the reach that runs adjacent to the Sunnyside Division averaged about 2.1 MAF (sum of Sunnyside diversion and Yakima River near Parker) for the period of record between 1939 and 1978. Water is diverted into the Sunnyside Main Canal just upstream of the Sunnyside Diversion Dam near Parker, Washington (River Mile 103.0; 1500 feet west and 130 feet south of the east quarter corner of Section 28, T12N, R19E, W.M.). SVID diverts between 600 and 1,300 cubic feet per second (cfs) of water during the irrigation season. At Kiona, just below the last influence of project return flows, the Yakima River averaged about 2.6 MAF per year for the same period. The gain in this reach is due to natural inflow and irrigation return flow from diversions taken upstream.

Flows in drains during the irrigation season are several times higher than during the non-irrigation season. Source of water for the drains during October 21 through March 14 (non-irrigation season) is mostly emerging groundwater. During the non-irrigation season flows range between drains from approximately 1 cfs in Snipes Creek Wasteway to near 90 cfs in Sulphur Wasteway. During the irrigation season flows are greatest in Sulphur Wasteway and average between 276 and 375 cfs. Irrigation season flows in Snipes and Spring Creek Wasteways generally range from 30 to 60 cfs (Romey and Cramer 2001). However, with implementation of the Phase 1 Water Conservation Plan by the SDBOC, irrigation season flows in these drains and wasteways have been reduced to 350 cfs and 15 cfs for Sulphur and Spring/Snipes Creek Wasteways, respectively.

3.2.2 Water Quality in the Lower Yakima River and SDBOC Drains and Wasteways

There have been significant improvements to the water quality of the four major SDBOC irrigation return flow waterways (drains and wasteways) to the Yakima River. The waterways are the Granger Drain, Sulphur Wasteway, Spring/Snipes Creek, and several small cumulative drains.

Water quality data has been collected for the following parameters: temperature, pH, dissolved oxygen, specific conductance, discharge, turbidity, total suspended solids, fecal coliform, total phosphorus, nitrate+nitrite, and total Kjeldahl nitrogen. The data shows definite seasonal patterns that are strongly influenced by the excess spill water which dilutes the drain return flow during the irrigation season. The irrigation districts have implemented measures aimed at bringing return flows into compliance with current water quality standards. The SDBOC water quality program and efforts by conservation groups such as the South Yakima Conservation District has resulted in significant improvements in the quality of water being returned to the Yakima River. For example, in Granger Drain turbidity concentrations have been reduced 74% from historic levels, and 75% in Sulphur Creek Wasteway. Spring Creek Wasteway has decreased 60% and Snipes Creek Wasteway has decreased 5% in turbidity from 1997 to 2008 (Zuroske 2009).

Evaluating median values by year, Snipes Creek had the lowest concentrations of most parameters and lowest instantaneous discharge. In most years, Granger had the highest concentrations or values of total suspended solids, turbidity, fecal coliform, and total phosphorus. Fecal coliform concentrations were the most variable. Nitrate+ nitrite concentrations were higher in Sulphur and Granger than in Spring and Snipes in every year. Instantaneous discharge was higher in Sulphur than the other waterways: it had the largest drainage area and received more operational spill water than Spring or Snipes. The patterns in changes in total dissolved solids and nitrate+nitrite concentrations between years were often similar; suggesting nitrate+nitrite was behaving somewhat conservatively.

3.2.3 Water Temperature

High water temperature in the lower Yakima River has been widely recognized as adversely affecting anadromous salmonids (YSPB 2005). High temperatures at the mouth of the Yakima River may delay adult steelhead migrations (YSFWRB 2008). Water temperature is a particularly difficult variable to change because it reflects the aggregate uses of the landscape, the amount of streamside shading, and many other factors. Vaccaro (1986) modeled water temperature in the Yakima River with four scenarios: (1) 1981 operations; (2) 1981 estimated unregulated or "natural" stream flows without storage or diversions; (3) reductions in irrigation diversions and irrigation return flows over the entire basin; or (4) similar reductions, but limited to the Yakima River below Parker. Vaccaro's model estimated that reducing return flows by 50 percent and subsequently leaving such flows instream would result in a slight increase in water temperatures at Prosser during the high water temperature period because, in late summer, major irrigation return flows are generally cooler than the Yakima River at the point of return. Reducing irrigation return flow volume by a relatively small amount though is unlikely to produce a measurable change in thermal dynamics of the Yakima River during summer. The relatively cool irrigation return flows will, however, create localized pockets of lower temperature where the flows enter the main river (Appel 2008).

From 2004 through 2007, a continuous water quality monitor at Kiona was deployed in the Yakima River for another study (Wise et al, 2009). Comparing the temperature in the river at the same 15-minute interval as SDBOC’s discrete sampling found that Spring and Snipes, located 12 miles upstream from Kiona, were cooler than the river in summer and warmer than the river in winter (Figure 3-1); the median and upper 90th percentile differences were 1.4 and 3.6 ºC in Spring and 1.2 and 3.8 ºC in Snipes. In this 12-mile stretch of the Yakima River, water temperatures in late summer 2008 were found to be generally homogenous: differences between left and right transects were typically less than 0.5 ºC; those between near-surface and near-bed temperatures were negligible; and differences between a stationary probe at Kiona and a probe pulled longitudinally through the river were typically less than 0.5 ºC (Marcella Appel, Benton Conservation District, unpublished data, 2008). Thus, the Kiona temperatures could be used with confidence to define river temperatures nearer to the mouth of Spring/Snipes Creek Wasteways (Zuroske, 2009).

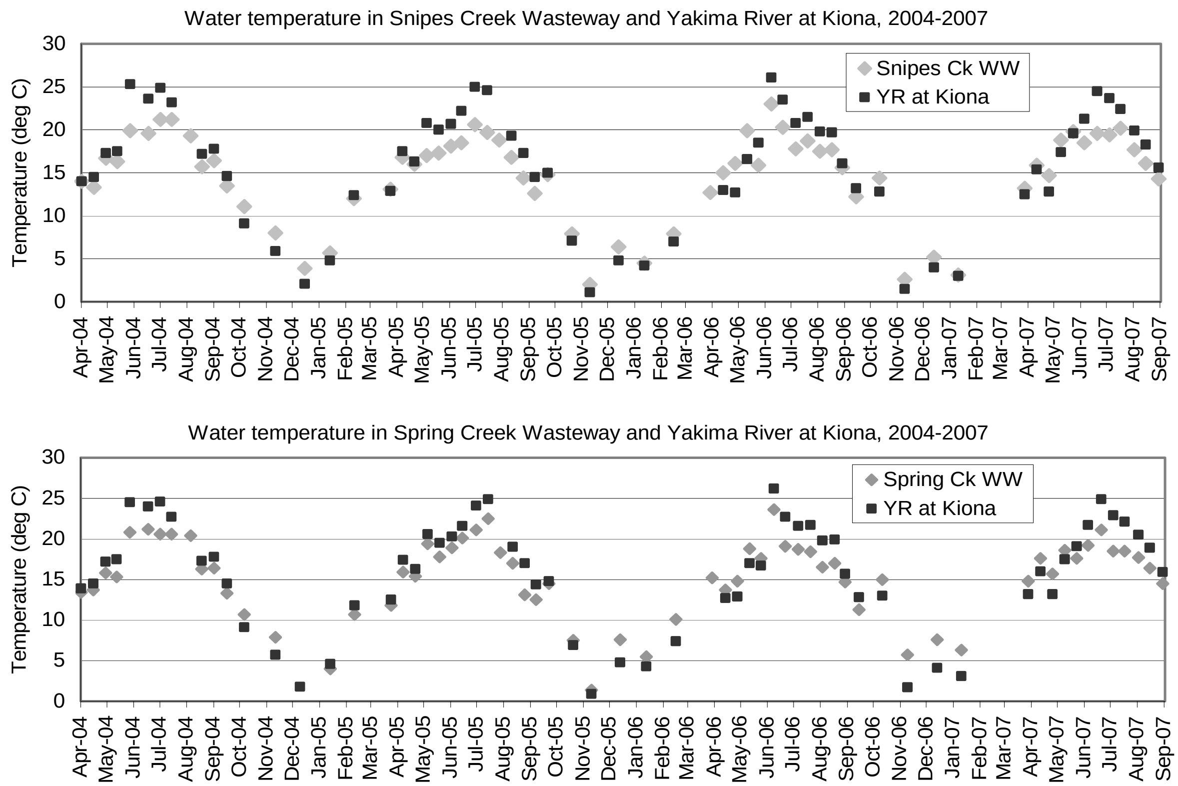

Figure 3-1. Continuous Water temperatures in Snipes Creek Wasteway and Spring Creek Wasteway comparisons to the Yakima River at Kiona 2004 – 2007 (from Zuroske 2009).

3.2.4 Turbidity, TSS, and Sediment Loads

As mentioned the SDBOC began a water quality monitoring program in 1997. Significant water quality improvements have been made in the Yakima River and in return flow irrigation drains as a result of implementation of the SDBOC's water quality management plan/policy (SDBOC 2004). For example, significant Total Suspended Solids (TSS) reductions have been realized since the 1997 assessment as a result of this water quality improvement program. To limit the transport of sediment and pesticides to the Yakima River, a goal of the SDBOC is to bring irrigation return flows into compliance with current state water quality standards and recent total maximum daily load (TMDL) goals for the lower Yakima River set by the Department of Ecology (Joy and Patterson 1997) and the Environmental Protection Agency under the Clean Water Act. Table 2.14 shows turbidity values recorded between 1997 and 2009, before and after the SDBOC implemented their water quality program. The SDBOC adopted the TMDL target turbidity goal of 25 NTU as its water quality goal for project waterways within its area of jurisdiction (SDBOC 2004). All irrigation runoff discharged to project waterways either directly or indirectly from lands within SDBOC boundaries had to comply with the water quality goal established by the SDBOC by the year 2002. Landowners completed conservation measures on farm to comply with the water quality plan/policy.

At the inception of the SDBOC water quality monitoring program in 1997, a significant increase in turbidity was observed at locations where agricultural return flow entered the Yakima River via major drains: Granger Drain, Sulphur Creek Wasteway, and Spring/Snipes Creek Wasteways. In 1997, turbidity values ranged from a low of 20 to a high of 275 NTU Ranges have decreased in recent years. In 2002, means and median turbidity values were 11 NTU at Snipes Creek, 22 NTU at Sulphur Creek, and 61 NTU at Granger Drain (Figure 3-2). Most of these values met the Department of Ecology's Total Suspended Solids TMDL 2002 goals. Turbidity levels have remained at relatively stable and low levels since 2001 or 2002. All drains and wasteways in the lower Yakima River basin have turbidity levels established by state standards since 2001 with the exception of Granger Drain.

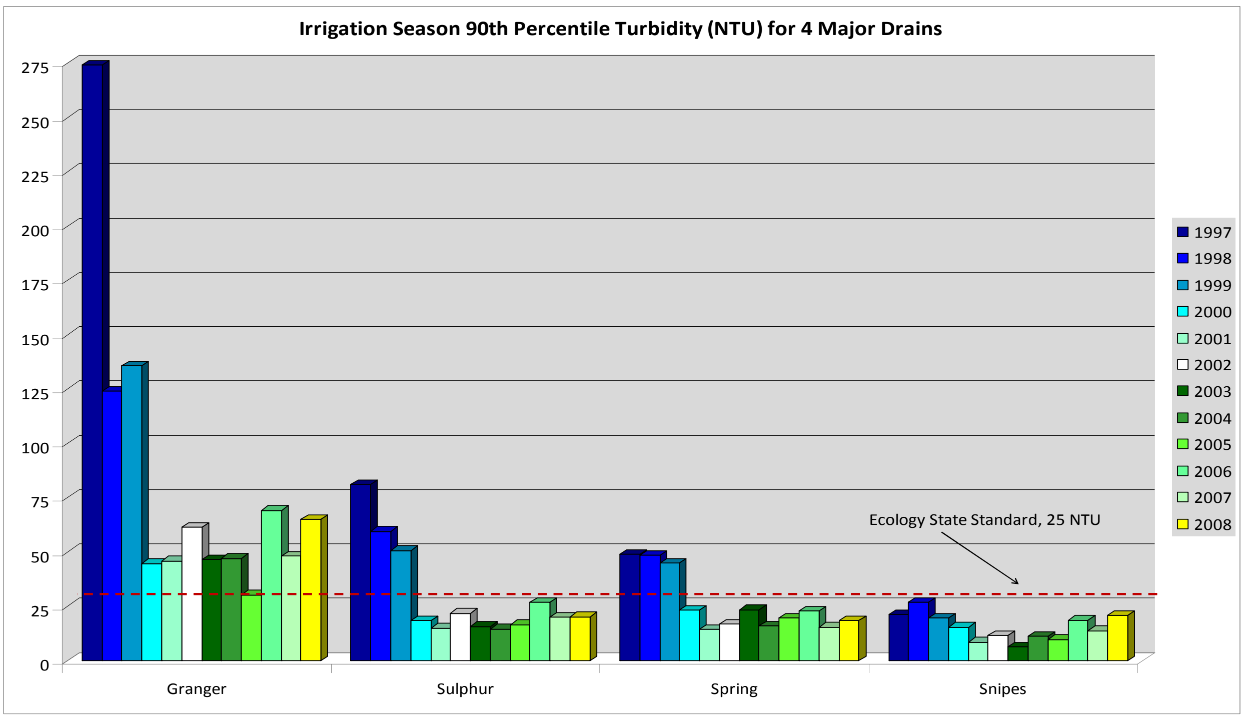

Figure 3-2. Annual 90th percentiles for turbidity measurements made in Granger Drain and in Sulphur, Spring and Snipes Creek Wasteways: 1997 to 2008. This graph shows that the SDBOC has met 5 year goals set by the Washington State Department of Ecology.

By combining the flow of each drain with the levels of turbidity observed, tons of sediment per day discharged into the Yakima River by these four major drainage outlets can be calculated (i.e. TSS loading). In 2002, the four major drains discharged between 1 and 23 tons/day to the lower Yakima River. This is a marked contrast from loading values estimated for 1997, when between 4 and 152 tons/day was discharged. The reduced water quality of return flows has been associated with the impairment of biological communities of fish, invertebrates, and algae in return drains and portions of the mainstem Yakima River (Morace et al. 1999).

As illustrated above, the SDBOC water quality program has resulted in significant improvements in the quality of water being returned to the Yakima River. In Granger Drain, the 90th percentile turbidity has been reduced 74% since 1997 (Zuroske 2009). As water quality conditions of return flows to the Yakima River improve due to the SDBOC efforts, adverse effects to aquatic resources will likely diminish.

Water quality conditions (temperature and dissolved oxygen), particularly during the irrigation season, may limit juvenile salmonid rearing in some wasteways and drains. Additional research is required to determine the suitability of the water quality of the SDBOC drainage network with respect to fisheries.

3.3 Threatened and Endangered Species

The Endangered Species Act requires Federal agencies to consult with FWS and NOAA Fisheries, as appropriate, to ensure that actions they authorize, fund, or carry out do not jeopardize the existence of a listed species or result in the adverse modification or destruction of their critical habitat. Reclamation is currently in the process of preparing a BA to assess any impacts to listed species from this proposed action.

The following lists those species listed by FWS and NOAA Fisheries as threatened or endangered within the project area:

Federal Listed

Endangered
None

Threatened
Bull trout (Salvelinus confluentus)
Steelhead trout (Oncorhynchus mykiss)
Ute Ladies'-tresses (Spiranthes diluvialis), plant

3.3.1 Steelhead Trout

The Middle Columbia River (MCR) Evolutionarily Significant Unit (ESU) of inland steelhead (Oncorhynchus mykiss) was listed as "Threatened" by NOAA-Fisheries 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 the NOAA-Fisheries has issued its final listing determinations for 10 Distinct Population Segments (DPS) of West Coast Steelhead (71 FR 834). The Middle Columbia River steelhead DPS remained listed as threatened in this document.

3.3.1.1 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 experienced declines in abundance in the past several decades as a result of natural and human factors (NMFS 1996, 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 1996). 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 rest are severely degraded (Dahl 1990, Tiner 1991). Washington 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 (Federal Ecosystem Management Assessment Team (FEMAT). Similarly 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 Middle Columbia River steelhead smolt at 2 years and spend one, two, or rarely, three years in the ocean (i.e., 1-salt, 2-salt, or 3-salt fish, respectively) prior to re-entering fresh water. Adult steelhead on their spawning migration 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.

Middle Columbia River 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 run size of the MCR DPS could have been in excess of 300,000 fish (Busby et al. 1996) although 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 harvest 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; NPPC 1986; McIntosh et al. 1990). The Washington Department of Fisheries (WDF 1993) estimated that the Yakima River had annual run sizes of 100,000 steelhead prior to development. 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. Within the Yakima River Basin, wild adult steelhead returns have averaged 1,818 fish (range 505 to 4,491) over brood years 1985-2007 as monitored at Prosser Dam (RM 47.1; YSPB 2005, brood year 2007 data from Yakima-Klickitat Fisheries Program (YKFP), available at: www.ykfp.org). 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; NPPC 2001). Generally, adult MCR steelhead migration into the Yakima Basin peaks in late October and again in late February or early March.

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% 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, however, adult migration resumes in February through April, coincident with the spawning run. Adult steelhead migration is essentially completed at Prosser Dam by early-April.

Most adult steelhead over-winter in the Yakima River between Prosser (RM 47.1) and Sunnyside Dams (RM 103.8) before moving upstream into tributary or mainstem spawning areas (Hockersmith et al. 1995). The Yakima River upstream of Prosser Dam is known to be occupied by steelhead as well as resident rainbow trout and provides important habitat for adult steelhead migration and holding, as well as for juvenile rearing for this species. In addition, the upper sections of the Yakima River and the entire Naches River basin contains important spawning habitat for steelhead and rainbow trout (Campton and Johnson 1985, NPPC 2001).

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 (YIN 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%), with a smaller proportion in the Naches drainage (32%), and the remainder in the mainstem Yakima River below Wapato Dam (4%), mainstem Yakima River above Roza Dam (3%), and Marion

Drain (2%), 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). Within the Naches Basin, most steelhead spawning (85%) occurred in the Naches River mainstem, primarily from river mile 2.7 (Cowiche Creek confluence) to the Little Naches River, with the remainder distributed in lower reaches of the Bumping River, Little Naches River, and Rattlesnake Creek (Cramer et al. 2003). Recent steelhead redd surveys conducted by the U.S. Forest Service indicate that steelhead redds were distributed throughout the Naches basin, particularly in Naches River tributaries such as Oak, Nile, Rattlesnake Creeks and in the Bumping, American, and Little Naches Rivers (Gary Toretta, USFS, unpublished data, 2004-2007).

Typically, steelhead 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 (Todd Pearsons, Washington Department of Fisheries and Wildlife (WDFW), personal communication). In the Naches, as elsewhere in the basin, spawning begins earliest at the lowest elevations. From radio tagging data and records of the first observations of steelhead fry, steelhead spawn in the lower Naches (below Tieton) and its tributaries from early March through mid May. In the upper Naches, the spawning period is from late March through late May. In the higher elevation tributaries of the upper Naches (the Little Naches River, Bumping River, Rattlesnake Creek), spawning occurs from late April through late May, with peak in early May.

Steelhead eggs take about 30 days to hatch at 50 degrees Fahrenheit, and another two to three 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 two years in the Yakima system, with a few fish maturing after three years and an even smaller proportion reaching the smolt stage after one 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 (NPPC 2001).

3.3.1.2 Yakima River Basin Steelhead Critical Habitat

The final rule designating critical habitat for 12 Evolutionarily Significant Units (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 Middle Columbia River (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. Also designated as critical habitat was the lower sections of several Yakima River tributaries and irrigation drains including approximately the lower one mile of Sulphur Creek Wasteway.

Critical habitat for steelhead in the Lower Yakima River and tributaries consists of primary constituent elements (PCEs) that support steelhead freshwater rearing, and migration habitat (NMFS 2004, 70 Fed. Reg. 52630). NMFS has determined that critical habitat PCEs exist in the Lower Yakima River as well as several tributaries but that they may vary "by site and biological function such that the quality of the elements may vary within a range of acceptable conditions" (70 Fed. Reg. 52630). Reclamation concurs with NMFS that streamflows and habitat conditions in the lower Yakima River currently support critical habitat PCEs for steelhead rearing, and migration in the environmental baseline, and that these PCEs exist in the Lower Yakima River and in Sulphur Creek Wasteway in the reach immediately downstream of the project area boundaries.

3.3.2 Bull Trout

On June 10, 1998, USFWS (USFWS 1998) listed the Columbia River population segment of bull trout, which includes the Yakima basin, as threatened. On June 10, 1998, the U.S. Fish and Wildlife Service (USFWS) listed the Columbia River population segment of bull trout, which includes the Yakima basin, as threatened. A final rule designating critical habitat for the Columbia River population segment of bull trout was published in the Federal Register on September 26, 2005 (70 Fed. Reg. 56211) and the designation became effective on October 26, 2005.

3.3.2.1 General Life History and Yakima River Population Characteristics

Bull trout populations within this population segment have declined from historic levels and are generally considered to be isolated and remnant. Bull trout were likely widely dispersed throughout the Yakima River drainage, limited only by natural passage and thermal barriers. The historical range may have approximated that of spring, summer, and fall chinook salmon

(*Oncorhynchus tshawytshca*), much as may have been the case in Idaho (Thurow 1987; Rieman and McIntyre 1993). The distribution of bull trout may parallel the distribution of potential prey such as whitefish and sculpins.

Yakima Basin studies indicate that bull trout typically occur in the upper reaches of several tributaries, in small populations that are mostly isolated from each other (Goetz 1994, Wissmar and Craig 1998, WDFW 1998). Studies have indicated that bull trout are most likely to occur, and to be strong in cold, high elevation, low- to mid-order watersheds with low road density (Rieman et al. 1997, Goetz 1994, MacDonald et al. 1996).

Bull trout have some of the most demanding habitat requirements of any native trout species mainly because they require water that is especially cold and clean. As a result, water temperature is a critical habitat characteristic for bull trout. Bull trout have demonstrated a unique adaptation for spawning, incubating, and rearing in colder water than salmon and steelhead which has allowed this species to survive in habitat areas that may be unsuitable for most other species of fish. Ratliff and Howell (1992) note that in many of the cold streams where bull trout spawn, they are the only fish present. McPhail and Murray (1979) demonstrated that survival of bull trout eggs was 80-95 percent to hatching at temperatures of 2-4ºC and dropped to 0-20 percent at temperatures of 8-10ºC. Buchanan et al. (1997) report observations from throughout Oregon and the published literature, and concluded that, while optimum temperatures for juvenile growth are between 4-10ºC, the optimum for adult bull trout is near 12-15ºC. Temperatures above 15˚C (59˚ F) exceed bull trout physiological preferences and are therefore thought to limit their distribution (Fraley and Shepard 1989).

Bull trout reach sexual maturity after 4 of more years and live up to 10 to 12 years. They typically spawn during September through November, in relatively cold streams that are clean and free of sediment. The incubation period for bull trout is extremely long, and young fry may take up to 225 days to emerge from the gravel (Craig 1997, USFWS 1998). Because of this long incubation period, eggs are particularly vulnerable to siltation problems and bed load movement in rivers and streams where spawning occurs. Any activity that causes erosion, increased siltation, removal of stream cover, or changes in water flow or temperature affects the number of bull trout that hatch and their ability to survive to maturity (Knowles and Gumtow 1996).

Bull trout exhibit both migrant and resident life history strategies. After rearing as juveniles for 2-4 years in their natal streams (Meehan and Bjornn 1991), migrant bull trout emigrate to larger rivers or lakes, whereas resident fish complete their entire life cycle within their natal stream. Migrant forms, including both fluvial (downstream migration to larger rivers) and adfluvial (downstream migration to lakes) grow rapidly, often reaching over 20 inches in length and 2 pounds by the time they are 5-6 years old. Migratory bull trout live several years in larger rivers or lakes, where they grow to a much larger size than resident forms before returning to tributaries to spawn. Growth differs little between forms during their first years of life in headwater streams, but diverges as migratory fish move into larger and more productive waters (Rieman and McIntyre 1993).

Although both the Fish and Wildlife Service (USFWS 2002) and the Washington Department of Fish and Wildlife (WDFW 1998) recognize the existence of a mainstem Yakima River subpopulation of bull trout, very little information exists to document the abundance or status of this fish in the mainstem Yakima River. Bull trout have been sporadically caught during electrofishing surveys in the upper Yakima River by the WDFW and adult bull trout have been observed migrating upstream through the Roza Diversion Dam fish ladders between the years of 1999 and 2003. In addition, inconsistent spawning activity has been reported in the reach between Keechelus Dam and Lake Easton in the upper basin. Bull trout observations in the lower Yakima River are more infrequent, consisting of a single adult fish captured in the mainstem Yakima River near Benton City by WDFW biologists in 1997.

Based on this information, it seems that the mainstem Yakima River is primarily used as migratory or rearing habitat for small numbers of adult and sub-adult bull trout. This may be the extent of the historic usage of the mainstem river by these fish. The lack of juvenile and sub-adult bull trout in the mainstem river indicates that bull trout are not and have not been reproducing successfully in the mainstem Yakima River. Given the fact that habitat conditions are not suitable for bull trout in the lower river, particularly high water temperatures during the summer, it is not surprising that few fish have been observed in the lower sections of the mainstem Yakima River.

3.3.2.2 Yakima River Basin Steelhead Critical Habitat

No critical habitat for bull trout has been designated on the Yakima River below the mouth of Ahtanum Creek which is above the area potentially affected by the proposed project.

3.3.3 Ute Ladies'-tresses

Ute ladies' tresses is a member of the orchid family and is found in wetland, riparian areas, spring habitats, mesic to wet meadows, river meanders, and floodplains. The plant occurs between an elevation range of 1,500 to 7,000 feet and at lower elevations in the western part of its range. The orchid generally occurs below montane forests, in open areas of shrub or grassland, or in transitional zones. It is considered a lowland species, typically occurring beside or near moderate gradient medium to large streams and rivers. The plant is not found on steep mountainous parts of a watershed, nor out in the flats along slow meandering streams. This species tends to occupy grass, rush, sedge and willow sapling dominated openings. There are no known populations of Ute Ladies' –tresses in the Yakima Basin.

3.4 Historic Properties

Cultural Resources are the manifestations of archaeological, historical, and traditional human uses of the project area. Historic Properties are cultural resource sites which are eligible for inclusion to the National Register of Historic Places, and therefore warrant consideration under the National Historic Preservation Act.

Human occupation in the southern Columbia Plateau, of which the Yakima River Basin is a part, began well over 10,000 years ago. The earliest human occupants, during the Windust and Vantage phases (11,000 to 6,500 BC) were nomads and occupied temporary camps. Windust Phase peoples relied on hunting mammals and birds, and the gathering of wild plants. The Vantage Phase showed an increased reliance on riverine resources such as fish. After 3,200 B.C.

people were increasingly living in pithouses and re-occupying locations for salmon harvesting. After 1,900 B.C. populations in the area had increased and settled villages had been established along the rivers. By at least 1,000 A.D. large winter villages consisting of semi-subterranean pithouses and larger longhouses had been established which revolved around a heavy reliance on salmon runs. Many of these winter villages were still occupied at the time of European contact.

The architecture and layout of winter villages became even more permanent with the introduction of the horse in the early 1700s. The indigenous peoples which had settled in the winter villages in the Yakima River Basin include the: Yakama, Palouse, Pisquouse, Wenatshapam, Klikatat, Klinquit, Kow-was-say-ee, Li-ay-was, Skin-pah, Wish-ham, Shyiks, Ochechotes, Kah-milt-pay, and Se-ap-cat. They are among the tribes and bands that are officially known today as the Confederated Tribes and Bands of the Yakama Nation, hereafter referred to as the Yakama Nation. The Yakama Nation is made up of the tribes and bands that signed the Treaty of 1855 ceding over six million acres to the white settlers. The modern Yakima Indian Reservation is located immediately west of the project area.

Euro-American occupation is most noticeable as related to irrigation agriculture. The Sunnyside Canal began as a private enterprise and, at the end of its initial construction 1891-1906, was "the largest private canal system in Washington" (56 miles of canal, 75 miles of laterals) (Pfaff 2002:13). Reclamation purchased the Sunnyside Canal irrigation system (i.e., Sunnyside Division) on June 23, 1906. This purchase included reservoirs, dams, the main canal and "all branch canals, laterals, and associated features such as flumes, headgate, and ditchriders' houses" (Pfaff 2002:34).

The Sunnyside Canal, when purchased by the Federal Government, was 56 miles long, had a capacity of 650 cubic feet per second at intake, supplied water to about 36,000 acres, and included mostly wooden control structures that were badly deteriorated and leaking. The system also included two main laterals (Snipes Mountain and Rocky Ford), with a combined length of about 25 miles, and about 50 miles of smaller laterals (Pfaff 2002:37).

3.5 Wetlands

Wetlands are critical ecological systems of importance to fish and wildlife. Existing acreages of wetland habitat are reduced compared to historical conditions. Existing wetlands include wet meadows, seeps, small shallow ponds and lakes, marshes, and riparian wetlands along streams. Wetlands have also formed from artificial water sources such as reservoirs, sewage lagoons, stock ponds, irrigation canals, and irrigated cropland runoff. For impact analysis purposes at this feasibility level, the National Wetland Inventory maps have been used to assess wetland impact, together with initial field investigation and review of aerial photographs.

Field investigations were performed by a consultant; RH2 Engineering Inc., to identify, delineate and characterize wetlands and associated critical areas in the vicinity of the proposed activities. Wetland and critical areas habitat was generally identified delineated and characterized within 100 feet of the proposed pipeline alignments. In several locations, investigation of confirmed wetland habitat was necessary as far as 300 feet from the proposed pipeline alignments in order to adequately characterize these areas. Current regulatory methodology used to complete field investigations and characterize wetland habitat.   Field investigations were performed for the proposed project alignments:

> Lateral 22.56 alignment begins at the Sunnyside Canal 22.56 headworks which includes pipelines 22.56, 22.56A, 22.56B, 22.56BA and 22.56C which cover approximately 22,250 feet (about 4.2 miles).
>
> Lateral 40.86 alignment begins at the Sunnyside Canal 40.86 HW which includes the existing 40.86 pipeline, portions of the 40.20 pipeline/open ditch and portions of the 39.79A pipeline, including 40.86, 40.86A, 40.86B, 40.20, 40.20A, 40.20B and 39.79A, covering approximately 22,665 feet (about 4.3 miles).
>
> Lateral 51.36 alignment begins at the Sunnyside Canal 51.36 HW which includes the existing 51.36 pipeline/open ditch, including 51.36, 51.36A, 51.36B, 51.36C, 51.36D, 51.36E MDA and 51.36H, and covers approximately 31,500 feet (about 6 miles).
>
> Lateral 59.28A alignment begins at the 59.28A HW east of SVID's re-regulation reservoir and west of Rothrock Road. The pipeline alignment involves the existing Lateral 59.28A open ditch, including 59.28A and 59.28AB, covering approximately 19,500 feet (about 4.3 miles).

Table 3-1 provides a summary of anticipated wetland impacts of the proposed project. In general, wetland habitat encountered along the proposed pipeline alignments is highly influenced by existing irrigation practices, which has resulted in a high groundwater table throughout much of the Yakima River Basin. Wetland conditions persist as a result of direct human alterations (farmer-operated irrigation ponds); the persistence of irrigated groundwater within depressions for long enough duration to influence vegetation, soils and hydrology; the seepage of irrigated groundwater at slope breaks persisting for long enough duration to create wetland habitat; and/or association with existing drainage features (i.e. Black Rock Drain, Spring Creek Wasteway and Snipes Creek) (RH2).

Table 3-1. Acreages impacted by the piping of laterals.

Lateral Name / Number	Wetland Name / Number	Wetland Cowardin & Hgm Classification	Wetland Category	Estimated Wetland Impact*	Estimated Cumulative Lateral Impact
22.56	22.56-a	Palustrine Emergent Depressional	Category III	0-0.01 acres	Up to 0.01 acres
40.86	40.86-a	Riverine Lower Perennial Emergent and Palustrine Emergent	Category III	0-0.06 acres	Up to 0.085 acres
40.86	40.86-b	Palustrine Emergent Depressional	Category III	0-0.005 acres	
51.36	51.36-a	Palustrine Emergent Slope	Category III	0 acres	Up to 1.0865 acres
51.36	51.36-b	Palustrine Emergent Slope	Category IV	0 acres	
51.36	51.36-c	Palustrine Emergent/Forested Depressional	Category IV	0-0.10 acres	
51.36	51.36-d	Palustrine Unconsolidated Bottom Forested Depressional	Category IV	0 acres	
51.36	51.36-e	Palustrine Emergent/Forested	Category III	0 acres	

		Depressional			
51.36	51.36-f	Palustrine Emergent/Forested Depressional	Category IV	0-0.005 acres	
51.36	51.36-g	Palustrine Emergent Depressional	Category III	0 acres	
51.36	51.36-h	Palustrine Emergent/Forested Depressional	Category III	0.09-0.48 acres	
51.36	51.36-i	Palustrine Emergent/Forested Depressional	Category III	0.003 acres	
51.36	51.36d-a	Palustrine Emergent Slope	Category IV	0.07 acres	
51.36	51.36d-b	Palustrine Emergent Slope	Category IV	0.35 acres	
51.36	51.36c-a	Palustrine Emergent Depressional	Category III	0 acres	
51.36	51.36c-b	Riverine Lower Perennial Emergent	Category III	0.005 acres	
51.36	51.36c-c	Palustrine Emergent Depressional	Category IV	0.02 acres	
51.36	51.36c-d	Palustrine Emergent Depressional^	Category III	0.053 acres	
51.36	Potential wetland – Lateral 51.36 and Joint Drain 51.4	Riverine Lower Perennial Unconsolidated and Rock Bottom Emergent^	Not Classified	0 acres	
51.36	Potential problem wetland - south of Johnson Road	Palustrine Emergent Slope^	Not Classified	0 acres	
51.36	Potential problem wetland - north of OIE	Palustrine Emergent Depressional^	Not Classified	0 acres	
51.36	Undelineated wetland – South of Weirs 51.36B - 10,11,12,13	Palustrine Emergent Depressional^	Not Classified	Unknown	
51.36	Potential problem wetland – Southwest of Wetland 51.36c-b	Palustrine Emergent Slope^	Not Classified	0.0005 acres	
59.28A	59.28A-a	Palustrine Emergent Slope	Category IV	0 -0.005 acres	Up to 0.025 acres
59.28A	59.28A-b	Palustrine Emergent Depressional	Category IV	0 acres	
59.28A	59.28A-c	Palustrine Emergent Depressional	Category III	0-0.01 acres	
59.28A	59.28A-d	Palustrine Emergent Depressional	Category III	0 acres	
59.28A	59.28A-e	Palustrine Emergent/Scrub-Shrub Depressional	Category III	0 acres	
59.28AB	59.28AB-a	Palustrine Emergent Slope	Category III	0 acres	
59.28A	Potential	Riverine Lower Perennial	Not	0-0.01 acres	

	wetland - Spring Creek Wasteway	Unconsolidated Bottom Emergent^	Classified		

*Estimated wetland impact is based on an assessment of the delineated wetland boundary with respect to the proposed pipeline improvements. This estimate reflects the author's best professional opinion of the anticipated impact area; however, individual wetland impact estimates are subject to change pending design modifications. Therefore, these estimates should be considered preliminary.
^Wetland Cowardin and HGM Classifications for potential and problem wetland areas are preliminary based on the author's best professional opinion of how these individual wetland areas would be classified. This information is intended to be preliminary as formal classification of these areas has not been completed.

As noted above, most of the wetlands are a result of on-farm irrigation ponds. Even with piping the laterals, these ponds may still continue operating, therefore many of these wetlands may not be affected. Wetlands that are the result of canal seepage will most likely disappear when the seepage is corrected.

The following soil types were identified during the field investigations: Scooteney silt loam gravelly, Wamba silt loam, Starbuck stony silt loam, Warden fine sandy loam, and Outlook silt loam. These are upland position soils that have a moisture regime of mesic to xeric, which do not naturally support wetlands.

Table 3-2. Plants identified in wetland survey.

Plants – Common Name	Plant – Scientific Name
Tapertip rush	Juncus acuminatus
White clover	Trifolium repens
Tall mannagrass	Glyceria elata
Perennial ryegrass	Lolium perenne
Broadleaf plantain	Plantago major
Small flowered forget-me-not	Myosotis laxa
Creeping spikerush	Eleocharis palustris
Colonial bentgrass	Agrostis capillaris
Three-square bulrush	Scirpus americanus
Black medic	Medicago lupulina
Reed canary grass	Phalaris arundinacea
Reed mannagrass	Glyceria grandis
Tapertip rush	Juncus acuminatus
Common duckweed	Lemna minor
Himalayan blackberry	Rubus armeniacus
Water smartweed	Polygonum amphibium
Water speedwell	Veronica annagalis-aquatica
Meadow barley	Hordeum brachyantherum
Russian olive	Elaeagnus angustifolia
Common cattail	Typha latifolia
Canada thistle	Cirsium arvense
Southern Beaked sedge	Carex utriculata
Sandbar willow	Salix exigua
Bittersweet nightshade	Solanum dulcamara
Sagebrush buttercup	Ranunculus glaberrimus
Tall fescue	Festuca arundinacea
Meadow fescue	Festuca pratensis
Multiflora rose	Rosa multiflora
Common velvet grass	Holcus lanatus
Creeping spikerush	Eleocharis palustris

Douglas' sedge	Carex douglasii
Thin-leafed alder	Alnus incana
Black cottonwood	Populus tricocarpa
Awl-fruit sedge	Carex stipata
Southern beaked sedge	C. utriculata
Soft rush	Juncus effusus
Fox sedge	C. vulpinoides
Yellow-flag iris	Iris pseudacorus

3.6 Wildlife

As part of the wetland field investigation conducted by RH2's Environmental Group, wildlife species were identified during the site visits. The following species were observed: magpies, Red-wing and Yellow-headed blackbirds, killdeer, sparrows, finches Yellow-bellied marmots (Marmota flaviventris, and Beechey ground squirrels (Spermophilus beecheyi). It was also noted during the investigations that cattle and livestock utilized the project area causing overgrazed affects.

3.7 Indian Trust Assets

ITAs are legal interests in property held in trust by the United States for Indian tribes or individuals. Examples of possible trust assets include lands, minerals, hunting and fishing rights, and water rights. The United States has a trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statutes, and Executive Orders, which are sometimes further interpreted through court decisions and regulations. This trust responsibility requires Reclamation to take all actions reasonably necessary to protect trust assets.

The Sunnyside Division is within lands ceded in the Yakama Treaty of June 9, 1855. This treaty established the Yakama Reservation and reserved rights and privileges to hunt, fish, and gather roots and berries on open and unclaimed lands to the fourteen Tribes and bands who signed that treaty.

Indian Trust Assets of concern for this action may include the rights and privileges to fish.

3.8 Environmental Justice

Executive Order 12898 requires each Federal agency to consider environmental justice as part of its decision making process by identifying and addressing disproportionately high adverse human health or environmental effects, including social and economic effects, of its programs and activities on minority populations and low-income populations of the United States.

Environmental justice requires Reclamation programs, policies, and activities affecting human health or the environment to not exclude minorities and low income groups from participation in or the benefits of programs or activities based on race or economic status.

People are the primary resource for social assessment and the vast majority of the people that comprise the affected communities reside within the Yakima and Benton County areas. Also included in the affected area is the Yakama Indian Nation.

The area in and around the project area has a relatively high population of minorities (approximately 42 percent in Yakima County and approximately 14 percent in Benton County compared to approximately 18 percent statewide). According to the 2000 census, in Benton County, the Hispanic population is 12.5% of the total population and the Indian population is 0.8% of the total population. In Yakima County, the Hispanic population is 35.9% of the total population and the Indian population is 4.5% of the total population. The Yakama Nation Reservation boundary is located within the project area.

3.9 Sacred Sites

Executive Order 13007, Indian Sacred Sites (May 24, 1996), directs executive branch agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites on Federal lands. The agencies are further directed to ensure reasonable notice is provided of proposed land actions or policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites. The EO defines a sacred site as a "specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion."

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

This section analyzes impacts of the action alternatives compared with the No Action Alternative. Impacts are those that result from implementation of the action alternatives relative to the no action alternative.

4.1 Fisheries

4.1.1 Fisheries Effects in the mainstem Yakima River

Instream flow improvements resulting from implementation of Alternative 2 will take place during the irrigation season and will increase target flows in the Yakima River between the point of diversion of the Sunnyside Canal and Spring Creek Wasteway or will have neutral effects to mainstem Yakima River flows downstream of the project area. During the storage control period, instream flows in the Yakima River will be increased by approximately 3 cfs when the conservation measures in Alternative 2 are implemented. This 3 cfs increase will be added to the existing Title XII minimum instream target flow requirements of 300 to 600 cfs at Sunnyside and Prosser Diversion Dams (depending on TWSA calculations each year). For the reach between Sunnyside Dam and Sulphur Wasteway the full amount of the 3 cfs diversion reduction will be realized as instream flow increases in the mainstem Yakima River. However, flow benefits will begin to decrease in the reach adjacent to the Sunnyside Division and downstream (i.e. from Sulphur Wasteway and Spring Creek Wasteway to the Yakima River at Kiona) because the amount of flow in the Yakima River will be reduced slightly due to return flow reductions that will result from water conservation savings.

Impacts to fish resulting from the implementation of YRBWEP conservation programs are documented in Section 4.6 of the PEIS (Reclamation, 2002). The water conservation associated with this action will contribute to the achievement of the positive impacts listed. The reduction in diversion will enhance flows between the Sunnyside Diversion Dam and the confluence with the Spring Creek wasteway, particularly during critical base flow periods. This should benefit adult and juvenile spring Chinook, fall Chinook and coho which move through this reach of the river during portions of the irrigation season. It may also benefit fall Chinook juveniles who rear for a short time during the irrigation season in this reach. These benefits help fulfill one of the purposes of YRBWEP. Below the Spring Creek confluence, the flows will be slightly decreased, in all cases by less than 1 percent, due to reduced spills as a result of improved efficiency. The benefits in the reach from the Sunnyside Diversion Dam to the mouth of the Spring Creek wasteway, which at the dam may be on the order of a nearly 20 percent increase in flows, would more than offset an negative impacts below the mouth of the Spring Creek wasteway.

4.1.2 Fisheries Effects in Project Return Flow Drains

Timing of return flow impact is somewhat dependent upon the nature of the conservation. Operational savings will affect return flow in the same time period the diversion reduction occurs. For the purposes of this analysis it was assumed that seepage return flow impacts would be uniformly distributed throughout the year. This is not precisely correct, but given the gross time divisions used in the analysis, the assumption is adequate.

Impact locations were classified into three categories based on the probable return flow location: Sulphur Wasteway, Spring Creek, or cumulative small drains. Operational spill savings from enclosing and piping open-channel laterals will accumulate in either the Sulphur Wasteway, Spring/Snipes Creek drainage networks, or in several small cumulative drains along SDBOC managed lands. Modeling performed by UMA Consultants Inc (UMA 2000) and more recently by RH2 Consultants (Don Schramm, SVID, personal communication, 2009) provided the split between these various spill locations. Table 4 summarizes the impacts to return flow for the three categories discussed. The flow in Sulphur Wasteway would be reduced by an average flow of approximately 1 cfs, which is essentially no change from the existing condtions. Impacts to Spring Creek and Snipes Creek Wasteways would be on the same order of magnitude. However, this flow reduction would constitute an 8% overall reduction in flow on top of reductions that have occurred as a result of implementing the Phase 1 water conservation measures at this location. Another source of flow reduction that will occur as a result of piping the open channel laterals will be from flow decreases occurring in various small drains and groundwater inflow locations within the SDBOC drainage network. It is estimated that water conservation measures in Alternative 2 will reduce these flows by a cumulative 2.5 cfs during the irrigation season. Cumulatively these flow reductions will reduce return flows to the Yakima River by approximately 4.5 cfs during the irrigation season (Table 4-1).

Table 4-1. Summary of Hydrologic Impacts to Irrigation Return Flow Drains and Wasteways from Implementing Water Conservation Measures from the Phase 2 Sunnyside Division Water Conservation Plan. Data from Mr. Don Schramm, SVID, personal communication, 2009.

Category	Average Flow cfs	Reduced Operation Spill cfs	Average Flow with Tier 1 cfs	Percent Flow Reduction
Sulfur Creek WW -Typical Average Spill Year				
Non-irrigation (19 Oct-31 Mar)	91	-	-	-
Irrigation (1 Apr to l8Oct)	224	1	223	0%
Spring Creek WW - Typical Average Spill Year				
Non-irrigation (19 Oct-31 Mar)	5	-	-	-
Irrigation (1 Apr to l8Oct)	18	1	17	6%
Cumulative Small Drains and Groundwater Discharge				
Non-irrigation (19 Oct-31 Mar)	32	-	-	-
Irrigation (1 Apr to l8Oct)	53	2.5	-	-
Total - Typical Average Spill Year				
Non-irrigation (19 Oct-31 Mar)	128	-	-	-
Irrigation (1 Apr to l8Oct)	295	4.5	290.5	2%

Conversion of open channel laterals to fully enclosed buried pipelines could result in a slight reduction in winter baseflows through the SDBOC drainage network. The magnitude of non-irrigation season flow reductions associates with Alternative 2 was so small that it could not be estimated with the model (Table 4-1).

Implementation of proposed conservation measures will reduce flows in Sulphur Creek, Snipes Creek and Spring Creek Wasteways by approximately 1 cfs during the irrigation season as measured for a typical year. Non-irrigation seasonal discharge rates will remain unchanged as a result of the proposed action. This rate of flow reduction will have minimal effects on anadromous fish since it will not limit or restrict access for adult fish into the wasteway and it will not significantly reduce spawning or juvenile rearing habitat currently available in the wasteway. In addition, water quality parameters will not change substantially as a result of the conservation measures so there should be little affect to adult or juvenile fish from altered water chemistry or physical conditions in the Sulphur Creek Wasteway.

It is likely that adult coho and fall chinook salmon will continue to be falsely attracted to Sulphur Creek Wasteway because there will still be sufficient water available in the drain to provide attraction flow even with the full suite of conservation measures implemented. This assertion is supported by the fact that adult salmon species have been observed migrating into Sulphur Creek Wasteway during the non-irrigation season when this wasteway is typically at or approaching its lowest baseflow discharge. Since baseflow conditions during the winter period will not change as a result of the proposed action, conditions that permit false attraction and migration into Sulphur Creek Wasteway will remain. A contributing factor to the likelihood of continued false attraction in this drain is that a large component of the discharge in Sulphur Creek Wasteway is derived from Roza Canal operational spills. Because Roza Canal operational spill will continue to occur at the current rate into Sulphur Creek wasteway and the fact that this return flow to the river is derived from the upper Yakima River, salmonids (especially coho), will continue to be attracted to this water source.

4.2 Water Quality

The SDBOC, of which the SVID is a member, began a water quality monitoring program in 1997. While data collection is on-going, the data for 1997 through 2003 was available for this study for various drains, the spillways and both main canals. Water quality data has been collected for the following parameters: temperature, pH, dissolved oxygen, specific conductance, discharge, turbidity, total suspended solids, fecal coliform, total phosphorus, nitrate+nitrite, and total Kjeldahl nitrogen. In this analysis most parameters were modeled based on simple concentration/dilution concepts. The remaining parameters do not follow these rules and their changes are not easily calculated. The proposed reduction in spills and seepage should not significantly affect dissolved oxygen, pH, or fecal coliform. Water temperature could change in the drains, but prediction of the resulting temperature was not attempted in this study.
Impacts during construction will be minimal because the pipelines will be constructed during the non-irrigation season. Once completed that pipelines will isolate the irrigation water from any stormwater runoff that might occur from the lands disturbed during construction. Best management practices will be used to limit any such runoff.

Slight reductions in flows in the spillways in the drains, Sulphur Creek Wasteway and Spring and Snipes Creek Wasteways will occur during the irrigation season. This reduction will mean that there will be less good quality irrigation water to dilute the groundwater entering the drains. As a result the concentration of contaminants, such as nitrates, that are carried into the wasteways and drains by groundwater will increase. The increases would vary depending on the constituent or part of irrigation season. Turbidity, TSS, and total phosphorus could decrease in concentration since the spill water is higher in these constituents than the base flow in the wasteways. Specific conductance and nitrate would increase during the irrigation season due to loss of dilution water from spills. Given the decreases in flow that are expected, on the order of 1- 2.5 percent these changes are not expected to be measurable. No change in concentrations for any parameter would occur during the non-irrigation season as no changes in flow are expected.

The water quality impact on the Yakima River will depend on location. Upstream of the confluence with Sulphur Creek Wasteway the water quality would remain essentially the same under the proposed conservation measures. The stream flow would increase, and the water quality would improve imperceptibly under the slightly reduced seepage above the wasteway. Just below the confluence with Sulphur Creek Wasteway, the increased flow due to reduced diversion is still greater than the reduction in return flow, therefore the constituent concentration would be principally unchanged. Below Spring Creek Wasteway the reduction in return flow exceeds the reduction in diversions by a small amount. The difference is so small, estimated to be less than 3 cfs, that the change in concentrations in the river would not be measurable.

4.3 Threatened and Endangered Species

4.3.1 Steelhead

The physical components of this conservation plan (e.g. conversion of open-channel laterals to fully enclosed pipeline distribution systems), and the hydrologic and water quality impacts (mainly increases in Yakima River flows and flow decreases in drains and wasteways) resulting from their construction will be spread over a large area and will be phased in over the two-year time frame to reach full implementation. Construction activities related to the installation of the physical components of the conservation plan will be located far from the mainstem Yakima River in dry canal or lateral alignments and will have little direct and immediate impact on fisheries biology or habitat features in the Yakima River.

Proposed construction timing for conservation plan structural elements of mid-October to mid-March (during the non-irrigation season) was chosen because the Sunnyside Main Canal and lateral water delivery systems had to be dry to allow construction activities to take place. Also this time period was also known to correspond with a time that avoided conflicts with as many of these steelhead life history forms as possible.

4.3.2 Bull Trout

Implementation of Phase 2 will have no affect on bull trout in the project area because of the extremely low numbers of bull trout presently inhabiting or using the lower Yakima River. Bull trout would likely not be found in the project area, particularly below the mouth of Spring Creek Wasteway, where slight decreases in summer flows are projected. If present in the reach from

Sunnyside Diversion Dam to the Spring Creek Wasteway, which is also unlikely, the increase in flows might benefit bull trout but any benefits would be immeasurable.

4.3.3 Ute ladies' –tresses

Ute ladies' –tresses habitat consists of wetland, riparian areas, spring habitats, mesic to wet meadows, river meanders, and floodplains. As part of the wetland field investigations where Ute ladies' –tresses would occur, no rare plants were observed. Therefore, there would be no impacts to Ute ladies'- tresses.

4.4 Historic Properties

This Project is subject to the requirements of Section 106 of the National Historic Preservation Act. Under Section 106 requirements, assessment as to whether or not a cultural resource is potentially eligible for the National Register, and whether the project will cause effects, must be completed.

A cultural resources inventory of the project was conducted in order to determine whether any historic properties would be impacted by the project. Prehistoric archaeological deposits and isolated finds in the vicinity of the project area are concentrated along the banks of the Yakima River and in the uplands (e.g., Rattlesnake Hills). There are two known sites on the lowlands recorded within 1.5 miles of the Area of Potential Effects (APE). A site in the vicinity of the APE was reported and described as containing a petroglyph and broken projectile point. However, the cultural resources survey did not identify any archaeological resources within the project APE. Ethnographic research and consultation with the Yakama Nation did not reveal any properties of traditional cultural importance within the project APE.

The following historic properties within the Sunnyside Division have been determined eligible for the National Register: Sunnyside Diversion Dam and Canal Headworks, Grandview Irrigation District, and Zillah Wasteway. The Sunnyside Irrigation System, whose primary feature is the Sunnyside Canal, was determined eligible to the National Register. The survey for this project assumed that the Area of Potential Effect (APE) is within a potentially eligible historic district and cultural resources greater than 50 years of age associated with irrigation had to be assessed for eligibility to the National Register both as individual properties and as contributing elements to a rural landscape. Pfaff (2002) presents guidelines regarding assessment of the eligibility of property types found on the Yakima Project as individual properties. The survey did not reveal that any of the laterals to be modified by this project contribute to the potentially eligible historic district.

Therefore Reclamation has found that no historic properties are affected by the enclosed lateral improvements project. These findings are being reviewed with the Yakama Nation and the Washington State Historic Preservation Officer for a final determination.

4.5 Wetlands

Wetland habitat associated with this project is highly influenced by existing irrigation practices. As such, many of the wetlands not associated with the on-farm ponds will most likely disappear when the laterals are enclosed. The Basin Conservation Program (BCP) implementation may result in the loss of irrigation induced wetlands, so Reclamation's land restoration and enhancement efforts will offset any potential loss (Reclamation, 2009). Currently, Reclamation has classified approximately 445 acres of wetland habitat that can be used as mitigation for the conservation programs in the Yakima Basin (personal communication, Jerry Jacoby, 2009).

4.6 Wildlife

All of the improvements to the main canal, the drop structures, checks and automation equipment would be installed on the existing canal banks or within the canal prism. As such construction of those items would not affect wildlife or wildlife habitat.

4.7 Indian Trust Assets

There would be no impacts to ITAs associated with the on-site activities of this action. The data show an increase in stream flows from Sunnyside Diversion Dam to the mouth of the Spring Creek Wasteway, which are expected to benefit anadromous fish stocks in the Yakima River (Reclamation, 1999).

4.8 Environmental Justice

Water is a limited resource, and in many years, demand is much higher than supply. This condition has prevailed in the area for several years. Under the No Action Alternative, this circumstance will continue into the future. Impacts to social well-being are positive compared to the no-action alternative, in that the improvement in water supply during water short times will likely lessen the potential conflict between water competing water users.

4.9 Sacred Sites

No sacred sites have been identified in the project area.

4.10 Cumulative Impacts

Cumulative impacts are those effects on the environment resulting from the incremental consequences of a proposed action alternative when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes these actions.

The YRBWEP PEIS addresses cumulative impacts for the portion of impacts attributable to the program actions. For this action, the impacts are also cumulative to the other elements of the YRBWEP that may be implemented. Since these impacts are considered in the PEIS they need not be addressed separately in this document. No additional cumulative impacts have been identified.

Department of Archaeology and Historic Preservation

National Oceanic and Atmospheric Administration-Fisheries

Sunnyside Division Board of Control

Yakima River Basin Water Enhancement Project

Washington Water Trust

RH2 Engineering Inc., Environmental Group

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