Section 3
Key Planning Elements by Implementation Area

3.1 Introduction

This plan addresses water quantity, water quality, instream flow and habitat elements. The following sections are designed to generally describe the existing conditions within each implementation area, and then specifically address how those conditions currently affect the four key planning elements.

3.1.1 Recent Events

In 2005, a wildland fire (known as the 'School Fire') spread over two Implementation Areas (IA) within the WRIA 35 watershed planning area: Pataha Creek IA and Tucannon River IA. The boundaries of the fire, as it relates to the planning area, are presented in Exhibit 3-1. Another wildland fire, known as the Columbia Complex fire, occurred in 2006. Restoration activities related to these fires are discussed in Section 6 of the plan.

The data used to develop the plan was collected prior to the School Fire. Future updates to the plan will be reflective of the data collected over time due to impacts of the fire on specific resources within the WRIA's implementation areas.

3.1.2 Instream Flow Negotiations

Under the Level 2 Instream Flow Assessment, the WRIA 35 Planning Unit developed a preliminary stream flow management strategy to integrate into the Middle Snake River Watershed Management Plan. Additional meetings and discussions with the agencies (Ecology and WDFW) were subsequently conducted to finalize the recommendations documented in this Watershed Plan. Over the course of three years, the Planning Unit participated in meetings and workshops to develop management objectives and strategies consistent with the Watershed Planning Act, which calls for strategies that address in-stream flow needs for fish and out-of-stream needs for people. Final draft recommendations for each implementation area are summarized in Appendix C and incorporated into the implementation area specific actions described in Section 6.

3.1.3 Rural Population Assessment

The following sections (3.2 to 3.6) for each implementation area include a summary of the water demand projections completed as part of the Level 1 Assessment (HDR-EES, 2005a). The Planning Unit also conducted an informal assessment of the rural population as part of developing the instream flow and groundwater management stategies. Those discussions are included in Appendix D as part of the groundwater management recommendations. In those discussions, as well as the demand projections completed in the Level 1 Assessments, the rural

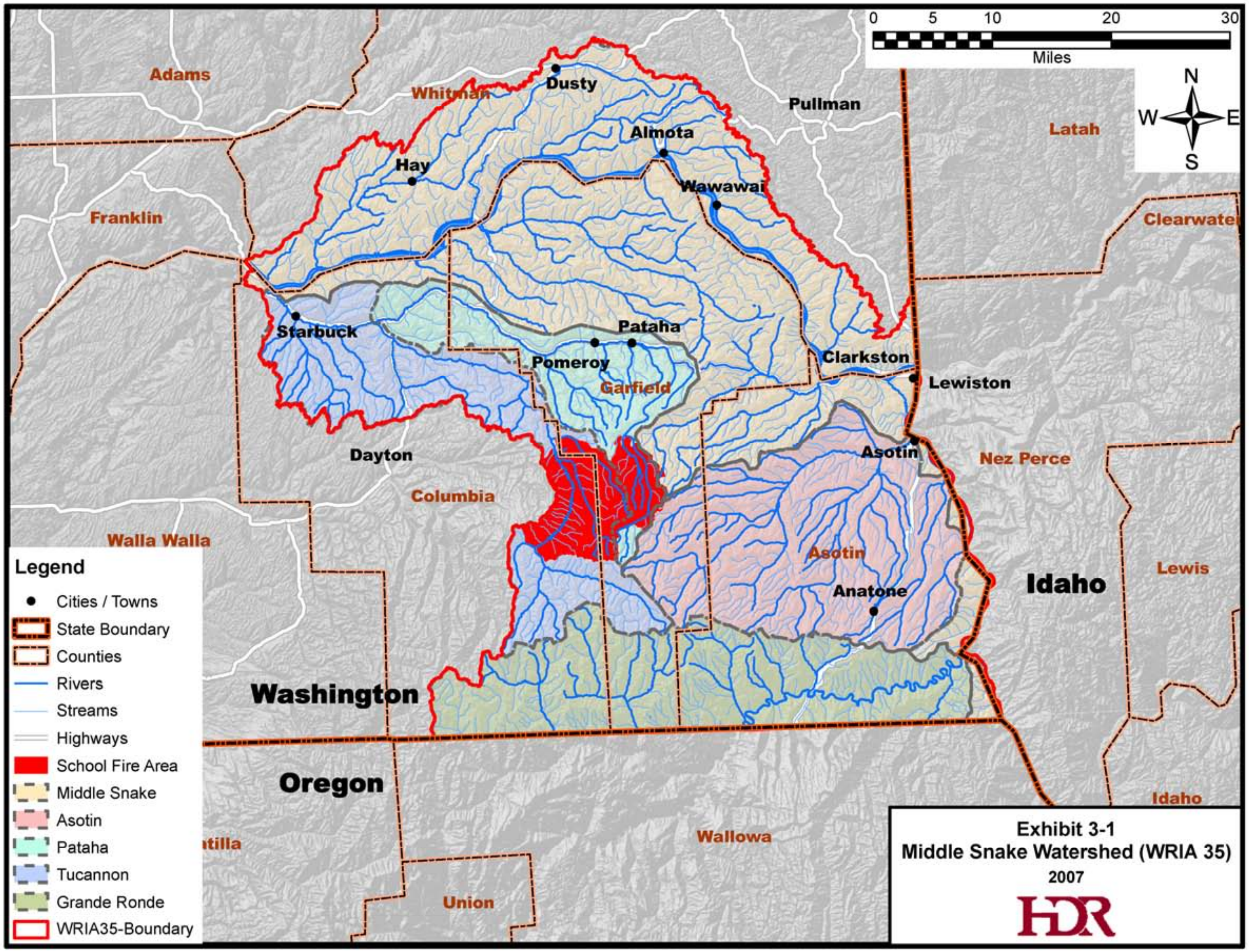


Exhibit 3-1
Middle Snake Watershed (WRIA 35)
2007
HDR

populations in the four counties in WRIA 35 indicate stable or slightly decreasing trend, which implies that domestic water supply demand will also remain stable or slightly decrease over time. This conclusion has bearing on the water supply, instream flow and groundwater management recommendations developed by the Planning Unit, as described in Section 6.

3.2 Asotin Creek Implementation Area

Asotin Creek Implementation Area (IA) is located west of the City of Asotin and includes the Asotin Creek drainage, its tributaries and George Creek. The Asotin Creek IA is approximately 325 square miles and land uses are a mixture of pasture and rangeland, forest, and cropland; however, the predominant land use is pasture and rangeland. Asotin Creek drains 119,000 acres and flows into the Snake River at the City of Asotin. George Creek drains 89,000 acres and enters Asotin Creek at RM 3.1. The population in the Asotin Creek IA is predicted to increase to 2,560 by the year 2025 from 2,463 people in the year 2005. A slight majority of the population (54 percent) currently resides in the City of Asotin; this trend is expected to continue through 2025.

According to the Asotin Creek Subbasin Summary (NPCC 2004), historic and current land use practices have altered the hydrologic cycle of Asotin Creek.

3.2.1 Historical, Current and Ongoing Watershed Activities

Local, state, and federal agencies, as well as tribes and landowners have been involved in watershed planning and implementation activities since the 1980s. Positive changes have been noted over time in improved watershed conditions due to these activities. Documentation of existing watershed restoration and recovery efforts has been made by the Asotin County Conservation District through funding reports to the Bonneville Power Administration (BPA). While not exhaustive, Table 3-1 demonstrates the extensive level of watershed activity in the IA. Exhibit 3-2 illustrates the approximate geographic distribution of existing Asotin County Conservation District projects, as well as depicting the general types of projects completed.

In 1990, the Asotin Creek watershed was selected by the Washington State Conservation Commission (WSCC), through a joint contract with the BPA, and with assistance from the Natural Resource Conservation Service (NRCS), to prepare and implement the Asotin Creek Model Watershed Plan. The purpose of the project was to help impact water quality and fisheries habitat concerns within the Asotin Creek Watershed by developing relationships between local landowners and resource agencies in the area. Specifically, the plan focused on enhancing and restoring habitat for Snake River spring/fall Chinook, summer steelhead, and bull trout[1]

[1] Model Watershed Development in Eastern Washington, Annual Progress Report, Project Period: October 1, 1996 to December 31, 1997

Exhibit 3-2 Existing Conservation District Projects in the Asotin Implementation Area

Table 3-1
Asotin Creek Watershed Planning and Implementation Activities, 1980s-2005

Date	Activity and/or Accomplishment
mid-1980s	Past efforts include a WDG Instream Habitat Improvement Project in the early to mid-1980s. This project was funded by the ACOE through the LSRCP and included researching current knowledge of instream habitat improvement methods and implementing instream improvements on publicly owned portions of Asotin Creek. A monitoring and evaluation study was included in this project.
1991	Asotin Creek Water Quality Monitoring Project implemented
1994	Asotin Creek watershed analysis completed
1995	Asotin Creek Model Watershed Plan completed
	BPA early action projects completed on Asotin Creek.
	Frost-free watering troughs installed at three locations in watershed.
1996	Implemented Headgate Park pre- and post- monitoring of habitat restoration projects
1997	The installation and completion of fish and wildlife restoration projects on Asotin Creek include: 11 in-stream habitat restoration projects; 3 riparian exclusion fences; 6 riparian fences; 14 sediment basins; 54 sediment basin cleanouts; 1 multi-purpose pond construction; 1,800 ft. of terraces; and 1 three-month water quality study
1998	246 projects completed through Asotin Creek Model Watershed Plan from 1995-1998, including construction of hard structures (e.g. vortex rock weirs), meander reconstruction, placement of large woody debris and whole trees to create off-channel rearing habitat. A total of 139 pools were created with these structures. Three miles of stream benefited from riparian improvements such as fencing, vegetative plantings, and noxious weed control. Two alternative water developments were completed, providing off-stream watering sources for livestock. A total of 20,500 ft. of upland terraces, 7 sediment basins, 187 acres of grass seeding, 850 acres of direct seeding and 18 sediment basin cleanouts were implemented to reduce sediment production and delivery to streams in the watershed.
1999	A total of 38 pools were created using habitat structures. Three miles of stream benefited from riparian improvements such as vegetative plantings (17,000 trees and shrubs) and noxious weed control. Two sediment basins, 67 acres of grass seeding, and 745 acres of minimum till were implemented to reduce sediment production and delivery to streams in the watershed. WDFW/ACCD baseline monitoring.
2000	The Asotin Creek Riparian Tree Planting Project planted approximately 53,100 trees and shrubs in the Asotin Creek watershed. WDFW/ACCD baseline monitoring.
	The ACCD partnered with the USFS to monitor sediment, cobble embeddedness, and macro-invertebrates. WDFW/ACCD baseline monitoring.
2001-2003	141,923 feet of fencing constructed; 186,300 trees planted; 13,045 acres of direct seed planted; 996 acres of pasture/hayland planted; 30 sediment basins constructed; 31,985 feet of terrace completed; 5 feedlot improvements; 31 water developments constructed; 7 sediment basins cleaned/repaired; 8 ponds constructed; 1 windbreak completed; 27 CREP contracts signed; 60.15 miles of CREP stream fenced; 1152.4 acres of CREP acres protected. WDFW/ACCD baseline monitoring.
2002-2003	Lick Creek: 28.5 miles of road surveyed, 21.3 miles of road decommissioned, 34 acres native grass seed planting, 7.2 miles of road abandoned; Charley Creek: 19 miles of road surveyed, 5 streambanks repaired and stabilized. WDFW/ACCD baseline monitoring. Asotin Creek adult/juvenile fish trapping.
2004 - 2005	Charley Creek: 19 miles of road decommissioning, 28 acres of native grass planting, 3 streambank stabilization 36 pieces of LWD, and 61 boulder placements for instream fish habitat enhancement. WDFW/ACCD baseline monitoring. Schlee property acquisition.

Source:
Asotin Subbasin Plan (Asotin County Conservation District 2004); BPA Final Reports 2003 & 2005 (Nez Perce Tribe Department of Fisheries Resource Management 2004 and 2005)

3.2.2 Water Quantity

There are four major categories of water users identified in the Asotin Creek IA including major public water systems (City of Asotin), small public water systems (Anatone), individual household wells, and agricultural water users.

Surface and Groundwater Rights

Summaries of the types of use and associated quantities for surface and ground water permitted and certificated water rights were compiled as part of the Level 1 Assessment for this plan (HDR-EES, 2005). The types of use indicated in the water rights database includes:

- Consumptive: irrigation, stock watering, municipal, domestic, and commercial
- Non-consumptive uses: power generation, fish and wildlife propagation, and recreation

Water rights with irrigation being one of the purposes of use accounts for a majority of the total annual water rights allocated based on this review.

Future Water Demand

Future demand for municipal and residential use was calculated using population forecasts (see Section 3.2), land use, and per capita demand and is presented in Table 3-2.

Table 3-2
Average Annual Volume Projection for Domestic Water Use In Asotin Creek Implementation Area (acre feet per year)

Year	City of Asotin	Rural Asotin Co.	Rural Garfield Co.
1990	353	-	-
1995	385	-	-
2000	394	141	22
2005	409	124	23
2010	430	140	23
2015	452	132	23
2020	475	121	23

Agricultural water use is limited in the Asotin IA. The 1997 Census of Agriculture documented only 329 acres of irrigated land. The majority of this land (289 acres) is pasture used for livestock grazing. Future development of vineyards in the area would likely increase the extent of irrigated agriculture in the IA. Barring the development of vineyards, agricultural activity and associated water use is anticipated to remain relatively constant over time.

3.2.3 Instream Flow

The instream flow recommendations specific to the Asotin Creek implementation area were developed as described in the assessment documents listed in Section 2. Exhibit 3-3 shows the locations of the instream flow management points and gauge locations for the Asotin Creek implementation area. Management point 12 is the location used for setting proposed instream flows on Asotin Creek. Table 3-3 includes a list of gauge locations used in development of instream flow recommendations.

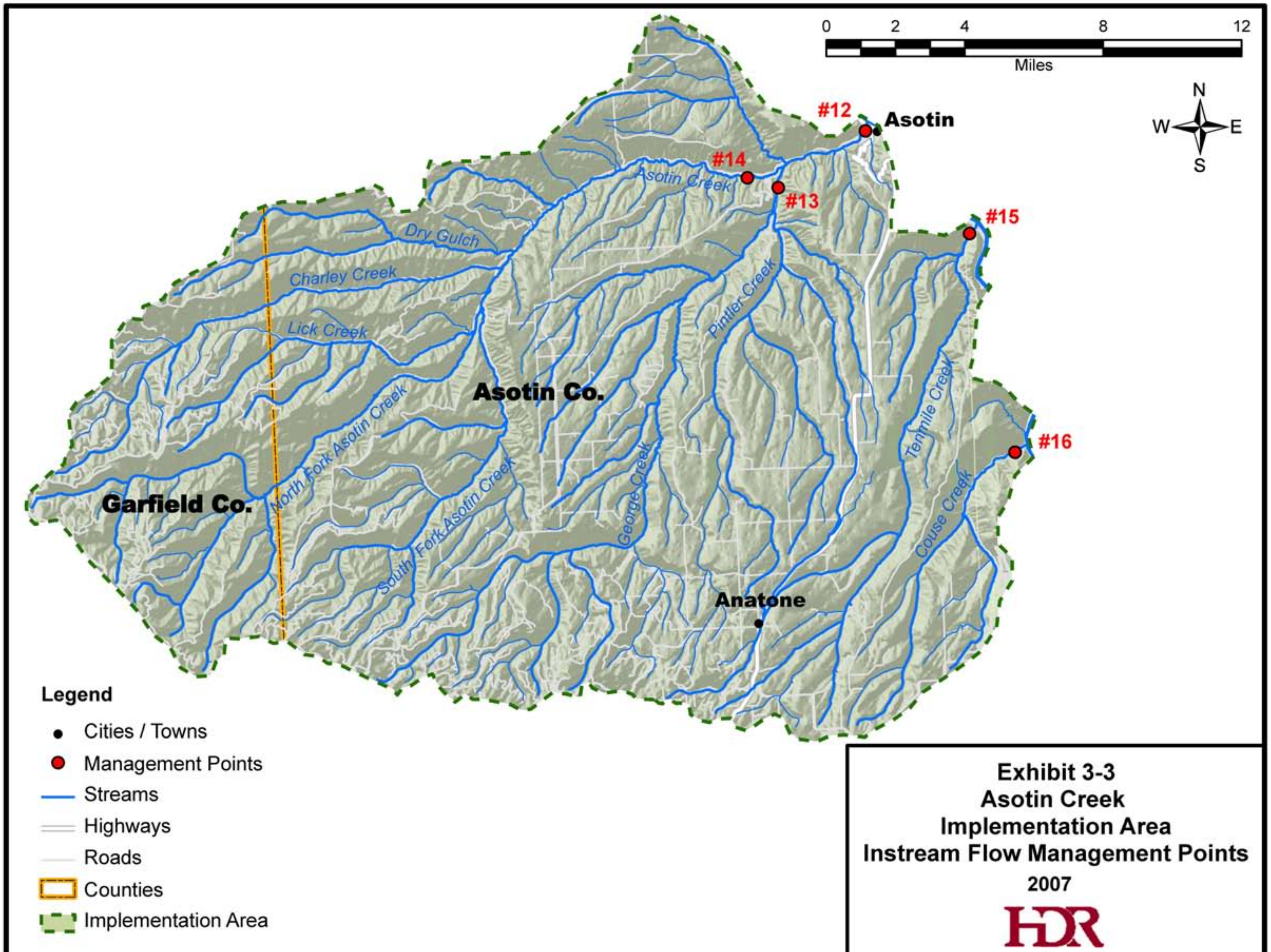


Exhibit 3-3
Asotin Creek
Implementation Area
Instream Flow Management Points
2007

Table 3-3

WRIA 35 Gauge ID Matrix for Asotin Creek Implementation Area

Gauge No.	Subbasin	Agency	Gauge ID	Location	Data Type	Period of Record
1	Asotin	USGS	13334700	Asotin Creek below Kearney Grade	Daily Streamflow	1959-1982; 1989-1996
2	Asotin	USGS	13334450	Asotin Creek at NF/SF Confluence	Daily Streamflow	2001-Present
3	Asotin	USGS	13334500	Asotin Creek near Asotin	Daily Streamflow	1928-1959
4	Asotin	USGS	13335050	Asotin Creek at Asotin	Daily Streamflow	1988-1989; 1991-2002
5	Asotin	USGS	13334400	Mill Creek at Anatone	Peakflow	1971-1977
6	Asotin	USGS	13334900	Pintler Creek near Anatone	Peakflow	1971-1977
7	Asotin	Ecology	35H050	Couse Creek at Mouth	Manual Stage Height	June 2003-Present
8	Asotin	Ecology	35J050	Tenmile Creek at Mouth	Manual Stage Height	June 2003-Present
9	Asotin	Ecology	35P050	Mouth of George Creek	Manual Stage Height	March 2006-Present
10	Asotin	Ecology	35D080	Asotin Creek gauge below George Creek	Manual Stage Height	February 2005-Present
11	Asotin	Ecology	35D100	Asotin Creek gauge above George Creek	Manual Stage Height	February 2005-Present

3.2.4 Water Quality

Major water impairments within the IA are temperature and fecal coliform, with temperature the most significant water quality impairment. Most high stream temperatures in the Asotin Creek drainage have been attributed to an overall reduction of riparian vegetation.

Table 3-4 shows the most recent 303(d) list of impaired water bodies released by Ecology. All waterbodies on the 303(d) list are classified as Category 5, meaning that Washington's state water quality standards have been exceeded, and there is no existing TMDL or pollution control plan. TMDLs are required for the water bodies in this category, but TMDLs are underway but have not been completed for this IA.

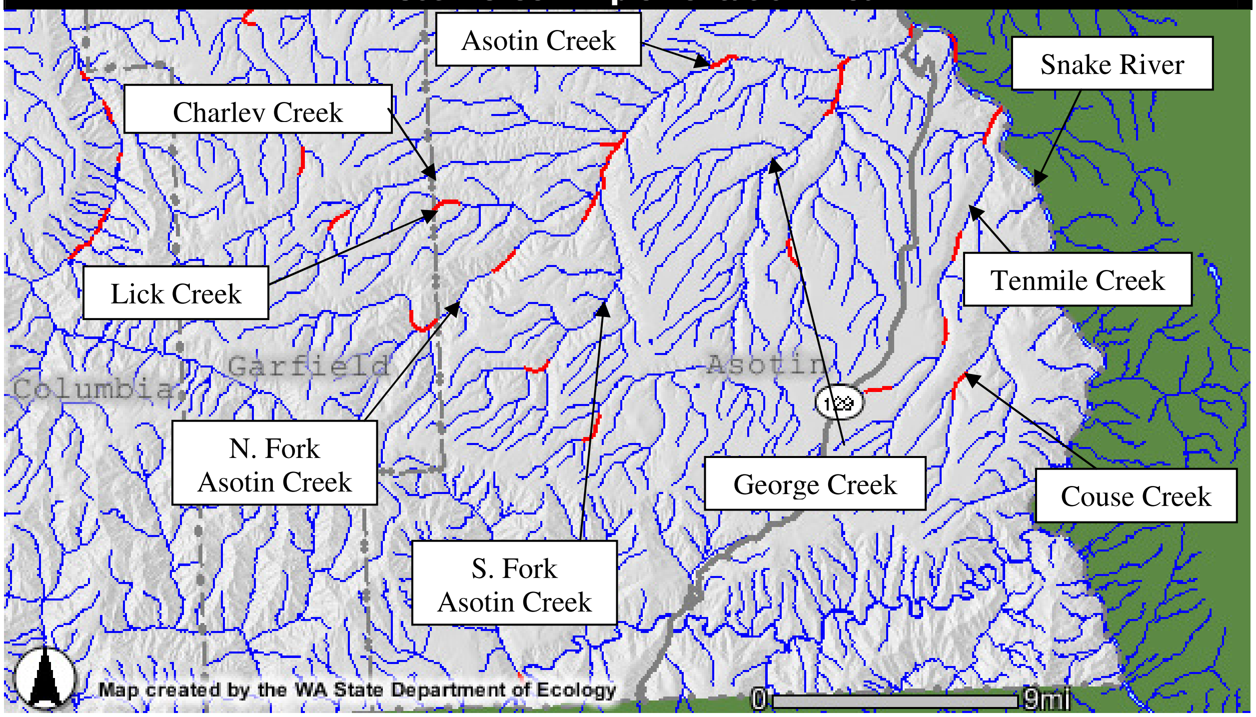
Table 3-4
2004 TMDL and 303(d) Listing Status in the Asotin Creek Implementation Area

Listing ID	WRIA	Water Body	Parameter	Category	TMDL Status
16795	35	Asotin Creek	Fecal Coliform	5	None
13863	35	Asotin Creek	Temperature	5	None
13852	35	Asotin Creek	Temperature	5	None
13854	35	Asotin Creek	Temperature	5	None
13851	35	Asotin Creek	Temperature	5	None
13860	35	Asotin Creek	Temperature	5	None
22425	35	North Fork Asotin Creek	Temperature	5	None
13985	35	North Fork Asotin Creek	Temperature	5	None
13986	35	North Fork Asotin Creek	Temperature	5	None
22426	35	South Fork Asotin Creek	Temperature	5	None
13858	35	South Fork Asotin Creek	Temperature	5	None
22427	35	Charley Creek	Temperature	5	None
13862	35	Charley Creek	Temperature	5	None
29320	35	Couse Creek	Temperature	5	None
29318	35	Couse Creek	Temperature	5	None
29321	35	George Creek	Temperature	5	None
22429	35	George Creek	Temperature	5	None
20352	35	George Creek	Temperature	5	None
22430	35	Lick Creek	Temperature	5	None
29317	35	Mill Creek	Temperature	5	None
20354	35	Pintler	Temperature	5	None
20356	35	Tenmile Creek	Temperature	5	None
18835	35	Tenmile Creek	Temperature	5	None
18836	35	Tenmile Creek	Temperature	5	None
20355	35	Tenmile Creek	Temperature	5	None

The impaired waterbodies in this area include the following and are illustrated in Exhibit 3-4:

- Asotin Creek mainstem
- North Fork Asotin Creek
- South Fork Asotin Creek
- Charley Creek
- Couse Creek
- George Creek
- Lick Creek
- Mill Creek
- Pintler Creek
- Tenmile Creek

Exhibit 3-4
2004 303(d) Listed Waterbodies in the
Asotin Creek Implementation Area



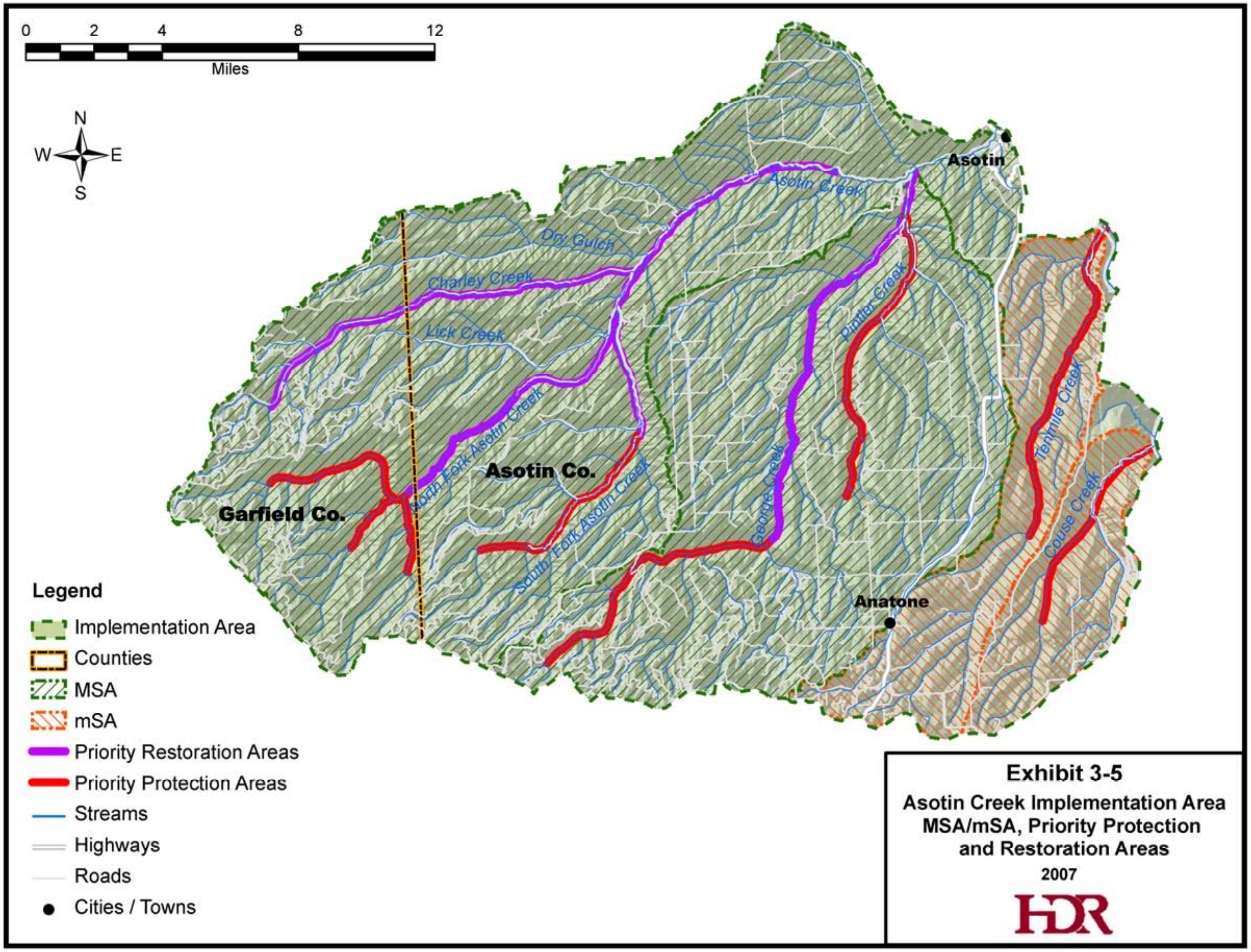
3.2.5 Aquatic Habitat

The Snake River Salmon Recovery Plan (SRSRP) (Parametrix 2006) and the Asotin Subbasin Plan has identified the following fish species as focal species within the Asotin Creek Implementation Area.

Snake River steelhead	*Oncorhynchus mykiss*
spring and summer Chinook	*Oncorhynchus tshawytcha*
bull trout	*Salvelinus confluentus*

The limiting attributes for these fish species were addressed in detail in the SRSRP and subbasin plan, and are generally summarized by drainage area below. Limiting attributes for fish were determined using Ecosystem Diagnosis and Treatment (EDT). The EDT process and specific details regarding the analysis may be found in the SRSRP and subbasin plan.

Exhibit 3-5 shows MSA/mSA's, and priority protection/restoration areas as described in the SRSRP (2006).


0 2 4 8 12
Miles
N
W
E
S
Asotin
Asotin Creek
Dry Gulch
Charley Creek
Lick Creek
North Fork Asotin Creek
Asotin Co.
Garfield Co.
South Fork Asotin Creek
George Creek
Pintler Creek
Tenmile Creek
Couse Creek
Anatone
Legend
Implementation Area
Counties
MSA
mSA
Priority Restoration Areas
Priority Protection Areas
Streams
Highways
Roads
Cities / Towns
Exhibit 3-5
Asotin Creek Implementation Area
MSA/mSA, Priority Protection
and Restoration Areas
2007
HDR

Asotin Creek Mainstem and George Creek

Sediment load, channel stability, key habitat quantity, and habitat diversity are the primary attributes limiting the abundance and productivity of steelhead and spring/summer Chinook in the Asotin Creek mainstem. Temperature and sediment are primary limiting factors in George Creek for steelhead. Both Asotin and George Creeks are listed on Ecology's 2004 303(d) list of water quality impaired streams, as indicated in Table 3-4.

Causes of Impacts to Asotin Creek and George Creek: From the late 19th century to about the middle of the 1960s, Headgate Dam had severe impacts on adult access and juvenile emigration. However, it and a handful of other potential physical obstructions are no longer considered significant problems for adults; however, juvenile migration may be limited in seeking cooler water. Unmanaged grazing, crop production, and residential development are believed to be primarily responsible for the current suite of limiting attributes in this portion of the IA.

Charley Creek

In the Charley Creek drainage, the aquatic assessment identified habitat diversity, key habitat quantity, channel stability, flow and temperature as the major limiting attributes for both steelhead and spring/summer Chinook. A lack of key habitat for adult migrants and adults in the holding life stage depresses production in the lower two reaches. Sediment and natural low flow limits production and juvenile life stages in the uppermost reach. Temperature had high impacts on spring/summer Chinook spawners and steelhead incubation in the lower reaches of Charley Creek, but minimal effects in the upper watershed.

Causes of Impacts to Charley Creek: Attributes limiting viability of salmonids in Charley Creek are somewhat different from those affecting the Asotin mainstem and George Creek because of a relatively greater impact associated with logging in the Charley Creek watershed. As with most watersheds in the West, historical logging operations have removed much of the old growth forest. By 1995, only about 400 acres of old-growth timber remained in the Asotin Creek IA, mostly along the North Fork Asotin and Charley Creek. Unmanaged livestock grazing and historic road development are also attributes limiting salmon viability.

North Fork and South Fork Asotin Creek

The lower portion of South Fork Asotin Creek is primarily impacted by sediment load and key habitat quantity, and secondarily by habitat diversity, channel stability, natural low flow, and excessive temperature. The upper South Fork and North Fork have experienced similar impacts, except that temperature and sedimentation are no longer limiting. It should be noted, however, that sedimentation problems in the lower South Fork are thought to originate in the upper South Fork.

Causes of Impacts to North and South Forks of Asotin Creek: The human actions that are most responsible for habitat degradation in the North and South Fork of Asotin Creek watersheds are recent and historical logging operations, roads, unmanaged livestock grazing, and farming on the tops of ridges in the South Fork drainage. Road construction has produced negative impacts to riparian zones including increases in sedimentation. A natural factor that significantly impacts fish production potential, especially in the headwaters area of the forks, is the very high gradient of many reaches (4 percent or greater). With the elimination of large woody debris from logging, channel stability, and habitat diversity become significant limiting attributes in very steep streams.

3.3 Middle Snake Mainstem Implementation Area

The Middle Snake Mainstem Implementation Area extends north from the Oregon border through a narrow corridor along the Snake River and is bounded in the north by WRIA 34 (Palouse Watershed). The watershed is impounded by Lower Granite Dam (RM107) and Little Goose Dam (RM 70.3) on the Snake River. The Middle Snake IA drains an area of approximately 1,102 square miles. Some of the major tributaries within the area include Alkali Flat Creek, Penawawa Creek, Almota Creek, Alpowa Creek, Deadman Creek and Meadow Creek.

The United States Army Corp of Engineers (USACE) controls some public lands adjacent to the reservoirs, with a few isolated parcels owned by the State of Washington. Most of the lands adjacent to the Snake River through this area are privately owned. Agriculture is the primary land use, which is dominated by non-irrigated farming in the uplands, irrigated farming in the valleys, and cattle ranching. A relatively small timber harvest occurs on portions of the forested upper watershed. The population in the IA is expected to increase from 22,244 in the year 2005 to 26,298 in 2025. The City of Clarkston and the surrounding urban area in Asotin County represents the only significant urban development and represents approximately 87 percent of the total IA population. It is expected that roughly 90 percent of the population will reside within the urbanized area Clarkston by 2025.

3.3.1 Historical, Current and Ongoing Watershed Activities

Local, state, and federal agencies, as well as tribes and landowners have been involved in watershed planning and implementation activities since the 1980s. Positive changes have been noted over time in watershed conditions due to these activities. Documentation of existing watershed restoration and recovery efforts has been made by the Pomeroy Conservation District. Exhibit 3-6 illustrates the approximate geographic distribution of existing projects, as well as depicting the general types of projects completed.

Exhibit 3-6 Existing Conservation District Projects in the Middle Snake Implementation Area

3.3.2 Water Quantity

The major categories of water users are major public water systems (City of Clarkston), small public water systems, self-supplied commercial/industrial users (primarily in the Clarkston urban area, but not supplied by Asotin PUD), individual household wells, agricultural water users. Although a majority of the population resides in Clarkston, pasture and rangeland, cropland, and forestland are the predominant land uses. Consequently, most water use is associated with agriculture.

Surface and Groundwater Rights

Summaries of the types of use and associated quantities for surface and ground water permitted and certificated water rights were compiled as part of the Level 1 Assessment for this plan (HDR-EES, 2005). The types of use indicated in the water rights database for the Middle Snake IA includes:

- Consumptive: irrigation, stock watering, municipal, domestic, commercial/industrial, fire protection, railway, highway
- Non-consumptive uses: power generation, fish and wildlife propagation, recreation, environmental quality

Water rights with irrigation being one of the purposes of use accounts for a majority of the total annual water rights allocated based on this review.

Future Water Demand

Future water demand for municipal and residential use was calculated by using population forecasts (see Section 3.3), land use, and per capita demand and is presented in Table 3-5.

Table 3-5
Average Annual Volume Projection for Domestic Water Use in Middle Snake Implementation Area (acre feet per year)

	Clarkston Urban Area	Rural Asotin Co.	Rural Columbia Co.	Rural Garfield Co.	Rural Whitman Co.
1990	4,690	-	-	-	-
1995	5,083	-	-	-	-
2000	5,437	54	11	152	272
2005	5,719	47	11	153	273
2010	6,001	53	11	153	275
2015	6,283	50	11	153	273
2020	6,597	46	11	153	273
2025	6,934	33	11	153	273

Approximately 400 acres of cropland are currently irrigated with surface diversions within the IA. These diversions are primarily located on Alkali Flat Creek and Alpowa Creek, with smaller diversions from Deadman, Almota, and Meadow Creeks. About 22 percent of all irrigation demand is met through surface water diversions; the remaining 78 percent comes from groundwater withdrawals. Agricultural growth in this area is expected to be limited due to the amount of additional land suitable and available for cultivation and the uncertainty of agricultural crop markets.

3.3.3 Instream Flow

The instream flow recommendations specific to the Middle Snake River implementation area were developed as described in the assessment documents listed in Section 2. Exhibit 3-7 shows the locations of the instream flow management points defined for the Asotin Creek implementation area. These management points were used as part of the development of the instream flow management recommendations. Table 3-6 includes a list of gauge locations used in development of instream flow recommendations.

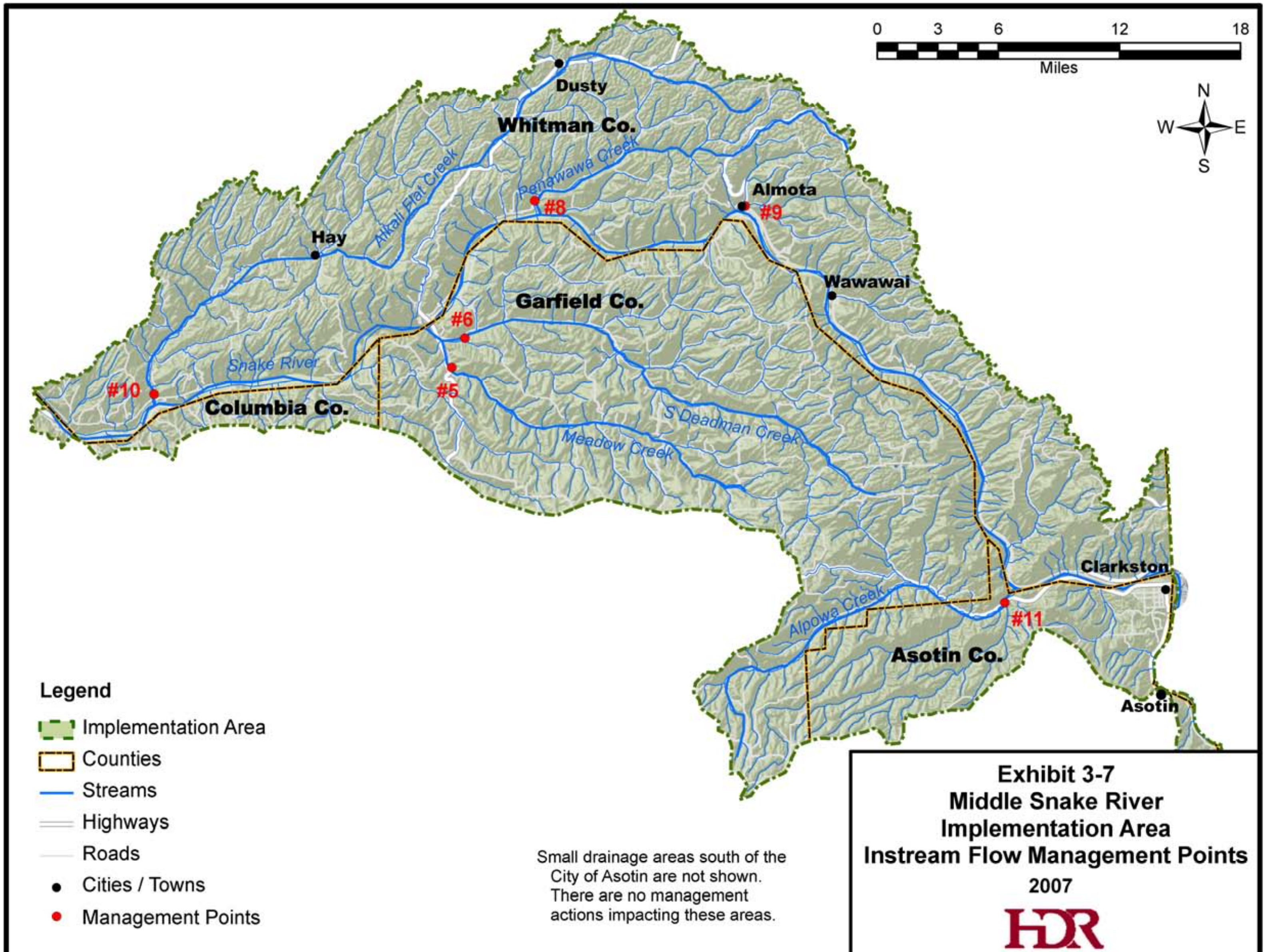


Exhibit 3-7
Middle Snake River Implementation Area Instream Flow Management Points
2007

Table 3-6						
WRIA 35 Gauge ID Matrix for Middle Snake River Implementation Area						
Gauge No.	**Subbasin**	**Agency**	**Gauge ID**	**Location**	**Data Type**	**Period of Record**
12	Lower Snake Mainstem	WSU	Lower Deadman	Lower Deadman Creek at Wilson's Banner Ranch	Spot Flow Data	2003
13	Lower Snake Mainstem	WSU	Upper Deadman	Upper Deadman Creek at Gould City, Downstream of North-South Fork Confluence	Spot Flow Data	2003
14	Lower Snake Mainstem	WSU	Lower Meadow	Meadow Creek near SR 127-Meadow Creek Road Intersection.	Spot Flow Data	2003
15	Lower Snake Mainstem	WSU	Upper Meadow	Meadow Creek at Ben Day Gulch Bridge	Spot Flow Data	2003
16	Lower Snake Mainstem	WSU	Alpowa	Alpowa Creek at Wilson's Banner Ranch	Spot Flow Data	2003
17	Lower Snake Mainstem	USGS	13334300	Snake River near Anatone	Real-Time	1959-2002; 1992-Present
18	Lower Snake Mainstem	USGS	13343500	Snake River near Clarkston	Daily Streamflow	1915-1973
19	Lower Snake Mainstem	USGS	13343510	Alpowa Creek at Peola	Peakflow	1971-1977
20	*Lower Snake Mainstem*	*USGS*	*13343590*	*Forebay of Lower Granite Dam (Lower Granite Lake)*	*Real-Time*	*NO DATA*
21	*Lower Snake Mainstem*	*USGS*	*13343595*	*Snake River below Lower Granite Dam (right bank)*	*Real-Time*	*NO DATA*
22	Lower Snake Mainstem	USGS	13343600	Snake River below Lower Granite Dam (left bank)	Daily Streamflow	1978-1985
23	Lower Snake Mainstem	USGS	13343620	South Fork of Deadman Creek, Tributary near Pataha	Peakflow	1961-1976
24	*Lower Snake Mainstem*	*USGS*	*13343855*	*Forebay of Little Goose Dam (Lake Bryan)*	*Real-Time*	*NO DATA*
25	*Lower Snake Mainstem*	*USGS*	*13343860*	*Snake River below Little Goose Dam*	*Real-Time*	*NO DATA*
26	Lower Snake Mainstem	Ecology	35K050	Alpowa Creek at Mouth	Telemetry	June 03-Present
27	Lower Snake Mainstem	Ecology	35L050	Almota Creek at Mouth	Telemetry	June 03-Present
28	Lower Snake Mainstem	Ecology	35M060	Deadman Creek near Mouth	Telemetry	June 03-Present
29	Lower Snake Mainstem	Ecology	35M100	Deadman Creek near Gould City	Telemetry	June 03-Present
30	Lower Snake Mainstem	Ecology	35N050	Meadow Creek at Mouth	Manual Stage Height	June 03-Present
31	Lower Snake Mainstem	USGS	13335200	Critchfield Draw near Clarkston	Peakflow	1959-1976
32	Lower Snake Mainstem	USGS	13343450	Dry Creek at Mouth	Peakflow	1963-1977
33	Lower Snake Mainstem	USGS	13343520	Clayton Gulch near Alpowa	Peakflow	1961-1976
34	Lower Snake Mainstem	USGS	13343660	Smith Gulch, Tributary near Pataha	Peakflow	1955-1974
35	Lower Snake Mainstem	USGS	13343700	Ben Day Gulch, Tributary near Pomeroy	Peakflow	1961-1969
36	Lower Snake Mainstem	USGS	13343790	Meadow Creek, Tributary near Central Ferry	Peakflow	1970-1977
37	Lower Snake Mainstem	USGS	13343800	Meadow Creek near Central Ferry	Daily Streamflow	1963-1974

3.3.4 Water Quality

The primary water quality concerns in the Snake River mainstem are elevated temperature along the entire length, excessive pH, low dissolved oxygen, increased total dissolved gas, and high toxics levels. Water quality impacts to tributary streams within the IA typically include high summer temperatures, excessive fecal coliform, and low dissolved oxygen.

Table 3-7 shows the most recent 303(d) list of impaired water bodies released by Ecology. All waterbodies on the 303(d) list are classified as Category 5, meaning that Washington's state water quality standards have been exceeded, and there is no existing TMDLs or pollution control plan. TMDLs are required for the water bodies in this category, TMDLs are currently scheduled but not completed for this IA.

Table 3-7
2004 TMDL and 303(d) Listing Status in the Middle Snake Implementation Area

Listing ID	WRIA	Water Body	Parameter	Category	TMDL Status
18842	35	Alkali Flat Creek	Temperature	5	None
18841	35	Alkali Flat Creek	Temperature	5	None
18843	35	Alkali Flat Creek	Temperature	5	None
20357	35	Almota Creek	Temperature	5	None
20358	35	Almota Creek	Temperature	5	None
40558	35	Alpowa Creek	Fecal Coliform	5	None
40556	35	Alpowa Creek	Fecal Coliform	5	None
40557	35	Alpowa Creek	Fecal Coliform	5	None
40553	35	Deadman Creek	Fecal Coliform	5	None
18829	35	Deadman Creek	Temperature	5	None
18828	35	Deadman Creek	Temperature	5	None
18827	35	Deadman Creek	Temperature	5	None
40555	35	North Fork Deadman Creek	Fecal Coliform	5	None
40554	35	South Fork Deadman Creek	Fecal Coliform	5	None
40534	35	South Fork Deadman Creek	Temperature	5	None
20360	35	Little Almota Creek	Temperature	5	None
20359	35	Little Almota Creek	Temperature	5	None
18831	35	Meadow Creek	Temperature	5	None
18830	35	Meadow Creek	Temperature	5	None
18840	35	Penawawa Creek	Temperature	5	None
18839	35	Penawawa Creek	Temperature	5	None
18833	35	Steptoe Creek	Temperature	5	None
18834	35	Steptoe Creek	Temperature	5	None
18838	35	Wawawai Creek	Temperature	5	None
19018	35	Snake River	4,4' - DDE	5	None
19017	35	Snake River	4,4' - DDE	5	None
16903	35	Snake River	Dissolved Oxygen	5	None
16927	35	Snake River	Dissolved	5	None

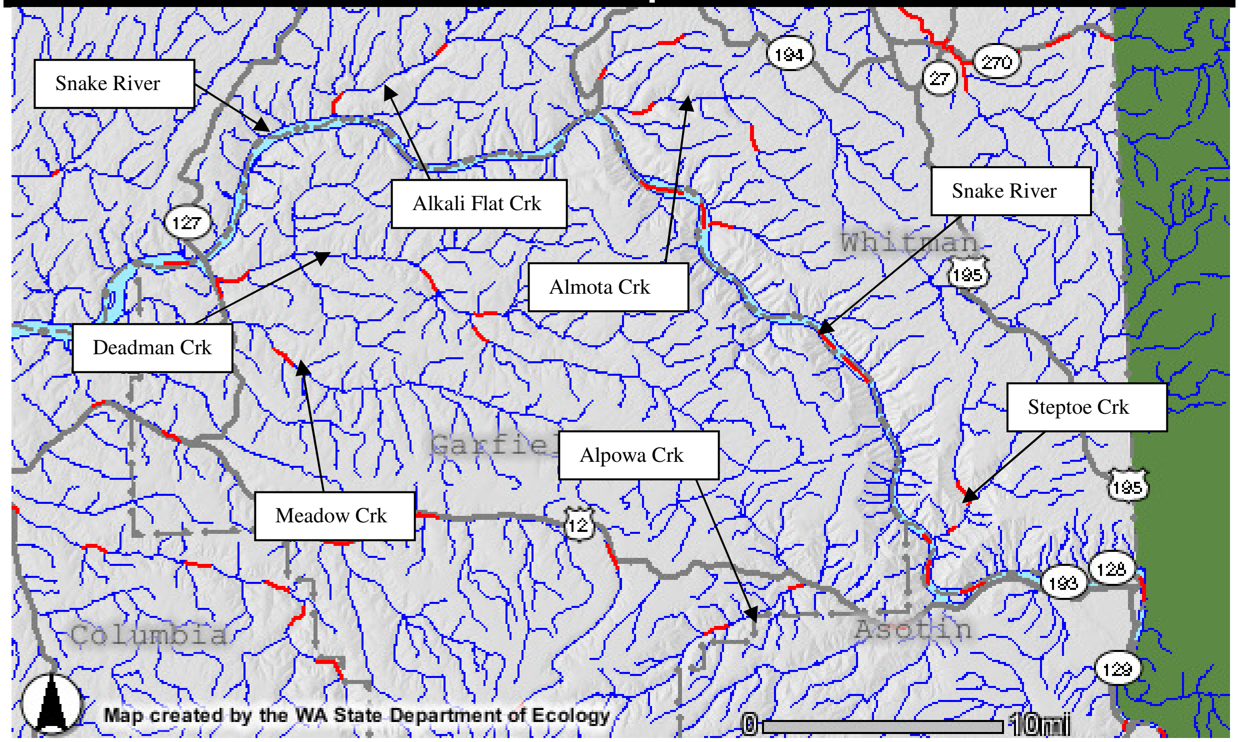
Table 3-7
2004 TMDL and 303(d) Listing Status in the Middle Snake Implementation Area

Listing ID	WRIA	Water Body	Parameter	Category	TMDL Status
			Oxygen		
16906	35	Snake River	Dissolved Oxygen	5	None
15173	35	Snake River	pH	5	None
15174	35	Snake River	pH	5	None
15175	35	Snake River	pH	5	None
11155	35	Snake River	pH	5	None
16931	35	Snake River	pH	5	None
16911	35	Snake River	Temperature	5	None
16929	35	Snake River	Temperature	5	None
16905	35	Snake River	Temperature	5	None
6307	35	Snake River	Temperature	5	None
6307	35	Snake River	Temperature	5	None
8285	35	Snake River	Temperature	5	None
19120	35	Snake River	Total PCB	5	None
19121	35	Snake River	Total PCB	5	None
18833	35	Snake River	Temperature	5	None
18834	35	Snake River	Temperature	5	None

The polluted waterbodies in this area include the following and to the extent possible are illustrated in Exhibit 3-8.

- Alkali Flat Creek
- Almota Creek
- Alpowa Creek
- Deadman Creek
- North Fork Deadman Creek
- South Fork Deadman Creek
- Little Almota Creek
- Meadow Creek
- Penawawa Creek
- Steptoe Creek
- Wawawai Creek
- Snake River

Exhibit 3-8
2004 303(d) Listed Waterbodies in the Middle Snake River Implementation Area



3.3.5 Aquatic Habitat

The SRSRP and subbasin plan has identified the following fish species as focal species within the Middle Snake Implementation Area.

Snake River steelhead	*Oncorhynchus mykiss*
spring and summer Chinook	*Oncorhynchus tshawytcha*
bull trout	*Salvelinus confluentus*

The limiting attributes for these fish species were addressed in detail in the SRSRP and subbasin plan and are generally summarized by drainage area below. Limiting attributes for fish were determined using EDT. The EDT process and specific details regarding the analysis may be found in the SRSRP and subbasin plan.

Exhibit 3-9 shows MSA/mSA's and priority protection/restoration areas as described in the SRSRP (2006).

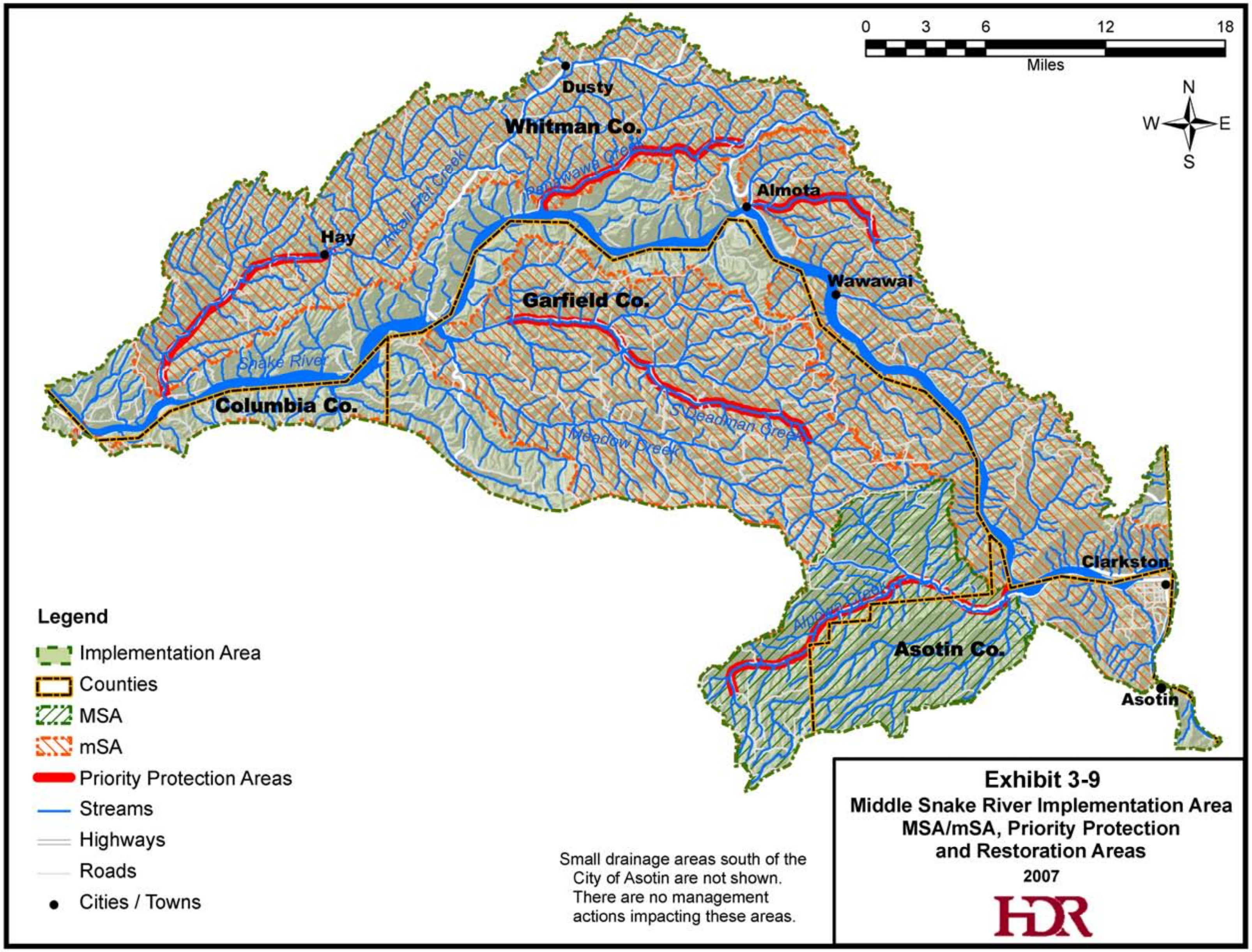


Exhibit 3-9
Middle Snake River Implementation Area MSA/mSA, Priority Protection and Restoration Areas
2007

Snake River Mainstem

Primary attributes that limit salmon production within the Snake River mainstem include dams (i.e., altered river conditions, increased dissolved gas, reduced passage, reduction of spawning and rearing, increased water temperatures), harvest (i.e., reduced numbers of adult spawners), and hatcheries (i.e., increased predation, increased disease, and altered genetics).

Snake River Tributaries

Within the Middle Snake IA, EDT habitat assessments were completed for Almota Creek and Deadman Creek. It was assumed that the habitat conditions in these streams were similar to conditions in six other small tributaries that were not analyzed including Alkali Flat Creek, Alpowa Creek, Penawawa Creek, Steptoe Creek, and Wawawai Creek. The habitat attributes most impacting abundance and productivity were sediment, low flow, reduced pool habitat, poor habitat diversity associated with scarce large woody debris and anthropogenic confinement, poor riparian function, excessive temperature, and passage obstructions.

Causes of Impacts to Almota and Deadman Creeks: Most of the limiting attributes are the direct or indirect result of the impacts of roads and agricultural practices, including grazing and cropping in the riparian zone and associated uplands. Sedimentation and low flows were attributed to crop production and grazing near the riparian corridor and in the uplands. Crop production often entails leaving the fields fallow in the summer which augments erosion potential of the riparian and upland areas. Reduced pool habitat was attributed to the scarcity of woody debris due to riparian degradation caused by crop production, grazing and roads.

3.4 Pataha Creek Implementation Area

The Pataha Creek Implementation Area is located near the center of WRIA 35 and follows the path of Pataha Creek, which runs roughly southeast to northwest. Pataha Creek drains 114,166 acres (185 square miles) and drains into the Tucannon River at River Mile 11.2. Major tributaries of Pataha Creek are seasonal streams that include Dry Pataha Creek, Sweeney Gulch, Bihmaier Gulch, Linville Creek, Tatman Gulch, and Dry Hollow. The primary land use is non-irrigated cropland farming and livestock production. Most of the irrigated cropland is located in the valley adjacent to Pataha Creek. Major jurisdictions in the area include Garfield County, Columbia County, and the USFS (Umatilla National Forest). The primary urban area is the City of Pomeroy, located on Pataha Creek in the northeastern portion of the IA. The population is anticipated to increase within the IA from 2,825 in the 2005 to 3,055 by the year 2025. Approximately 54 percent of the population currently resides in the City of Pomeroy; this is expected to increase to roughly 58 percent by 2025.

3.4.1 Historical, Current and Ongoing Watershed Activities

In 1993, BPA funded the Pataha Creek Model Watershed Projects and Tucannon River for implementation of watershed activities in the subbasin. Positive changes have been noted over time in watershed conditions due to these activities. Documentation of existing watershed restoration and recovery efforts has been made by the Pomeroy and Columbia Conservation

Districts. While not exhaustive, Table 3-8 and Exhibit 3-10 demonstrates the extensive level of watershed activity in the IA.

Table 3-8
Pataha Creek Watershed Planning and Implementation Activities, 1980s-Present

Date	Activity and/or Accomplishment
1993-present	Water quality monitoring on Pataha, Deadman and Alpowa Creeks
1998	Deep fall subsoiling on 1,130 acres; no-till seeding on 1,453 acres; two pass seeding on 795 acres; 4.2 acres of critical area seeding; 15 sediment basins constructed; divided slopes installed on 128 acres; 26,760 feet of upland and riparian fencing installed; 24.4 acres of upland buffers established; 3.67 acres of riparian buffers established; 79 acres of grasses and legumes introduced into rotation; 13,551 feet of grass waterways established; 6,949 feet of pipeline installed for alternative stock watering source; 100 feet of streambank protection
1999	Deep fall subsoiling on 1,933 acres; no-till seeding on 2,185 acres; two pass seeding on 1,974 acres; 17 sediment basins constructed; 1 riparian fence installed on 1 acre ; 4.6 acres of upland buffer strip established; 3,433 feet of grassed waterway established; 150 feet of streambank protection ; 18,268 feet of terraces rebuilt and/or constructed; 10,000 willow and cottonwood whips and poles planted
1999-2002	689 acres and 56 miles of streambank enrolled in CREP program
1999-2005	Information and education programs (newspaper articles, newsletters; fish aquarium at local grade school with hatched trout released into local pond).
2003	No-till seeding on 1,173 acres; direct seeding on 930.6 acres; 1500 feet of fencing installed; ongoing water quality monitoring (since 1993); 163 acres and 13 miles of streambank (66,226 feet) enrolled in CREP program; 81,000 trees planted in riparian buffer zone.
2003-05	23 water quality projects underway to remove livestock winter-feeding and concentrated areas away from streams; began activities to control False Indigo invading county streams
2004	No-till seeding on 1,483.8 acres; direct seeding on 1487.6 acres; 74.4 acres planted in pasture and hay; 2 sediment basins constructed; 16 irrigation water usage meters installed
2005	No-till seeding on 961 acres; direct seeding on 238 acres; 5 sediment basins constructed; 84 additional acres enrolled in CREP program; 8 miles of riparian fencing constructed; 4,300 trees planted; 16.38 miles of stream bank protected; 83.5 acres of riparian buffers established; 3 alternative water systems developed; weed control, fence and water system repair, and grass reseeding projects conducted; 2 irrigation efficiency surveys conducted

Notes:
Bartels, Duane, "Pataha Creek Model Watershed", Project No. 1999-02100, 27 electronic pages, (BPA Report DOE/BP-14994-1); Bartels, Duane, "Pataha Creek Model Watershed", Project No. 1994-01807, 26 electronic pages, (BPA Report DOE/BP-12585-1); 2003, 2004, 2005 Reports of Accomplishments, Pomeroy Conservation District

Exhibit 3-10 Existing Conservation District Projects in the Pataha Implementation Area

3.4.2 Water Quantity

The primary categories of water use in the area are major public water systems (City of Pomeroy), small public water systems, self-supplied commercial/industrial users, individual household wells; and agricultural water users. Because the primary land uses are connected with agriculture (i.e. pasture and rangeland, cropland, and forestland), the City of Pomeroy represents only a relatively small overall water demand, while the most significant water use is associated with agricultural.

Surface and Groundwater Rights

Summaries of the types of use and associated quantities for surface and ground water permitted and certificated water rights were compiled as part of the Level 1 Assessment for this plan (HDR-EES, 2005). The types of use indicated in the water rights database for the Middle Snake IA includes:

- Consumptive: irrigation, stock and wildlife watering, domestic, commercial/industrial, railway

Water rights with irrigation being one of the purposes of use accounts for a majority of the total annual water rights allocated based on this review. Domestic and stock watering rights closely follow irrigation for quantity of water rights.

Future Water Demand

Future demand for municipal and residential use was calculated using population forecasts (see Section 3.4), land use, and per capita demand and is presented in Table 3-9.

Table 3-9
Average Annual Volume Projection for Domestic Water Use In Pataha Creek Implementation Area (acre feet per year)

	City of Pomeroy	Rural Columbia Co.	Rural Garfield Co.
1990	-		
1995	-		
2000	431	11	59
2005	462	11	59
2010	470	11	59
2015	476	11	59
2020	493	11	59
2025	510	11	59

Current water rights data indicate that approximately 800 to 900 acres are being irrigated within the Pataha Creek IA. Primary crops include grass hay, alfalfa hay, and grain. Surface water is primarily diverted from Pataha Creek, while most groundwater is withdrawn from wells near Pataha Creek. Approximately 78 percent of irrigation demand is met through groundwater withdrawals.

The limited amount of additional land available for cultivation and the uncertainty of agricultural crop markets will likely prohibit future agricultural development. Consequently, irrigation water demand is expected to remain constant over time.

3.4.3 Instream Flow

The instream flow recommendations specific to the Pataha Creek implementation area were developed as described in the assessment documents listed in Section 2. Exhibit 3-11 shows the locations of the instream flow management points defined for the Pataha Creek implementation area. These management points were used as part of the development of the instream flow management recommendations. Table 3-10 includes a list of gauge locations used in development of instream flow recommendations.

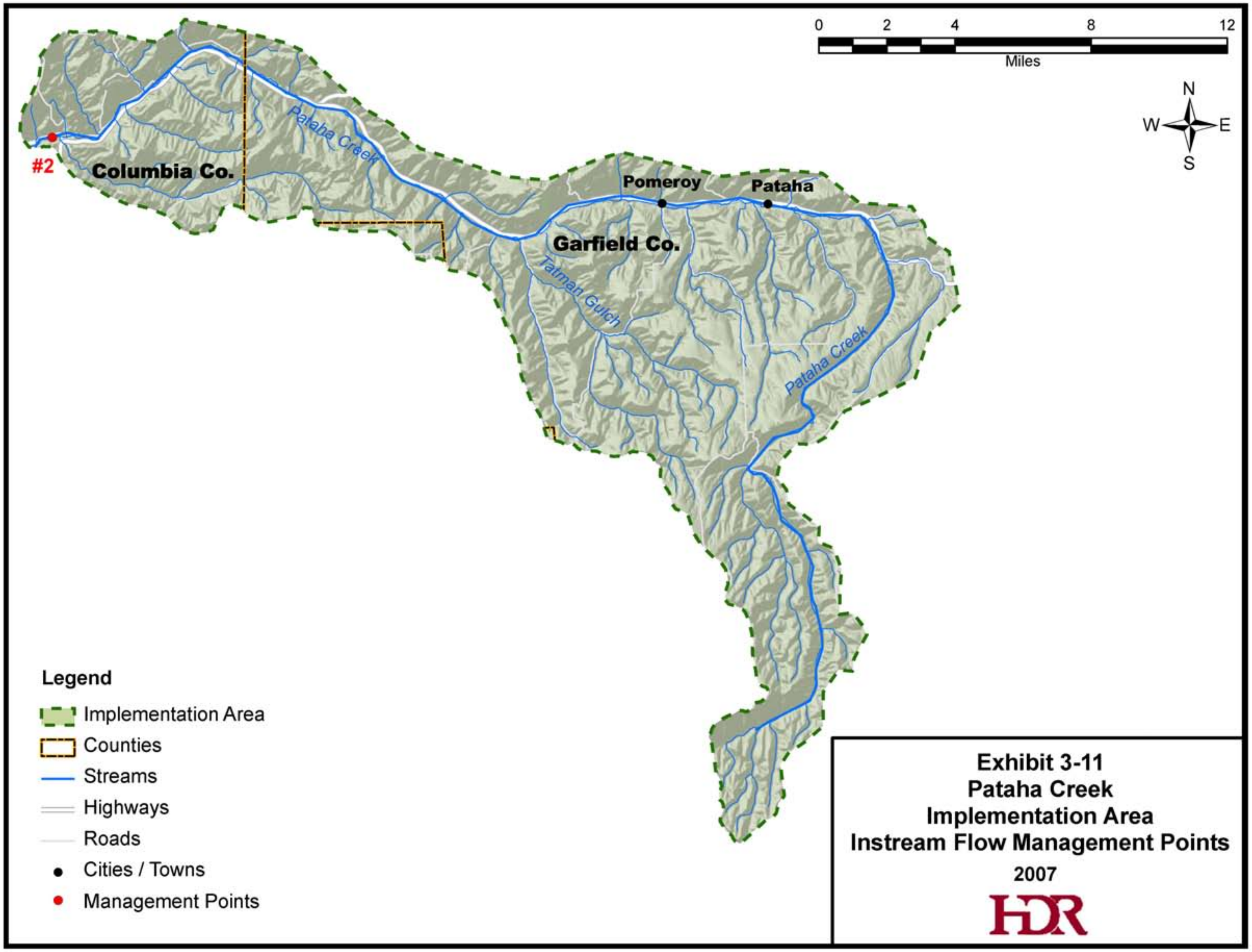


Exhibit 3-11
Pataha Creek
Implementation Area
Instream Flow Management Points
2007

Table 3-10

WRIA 35 Gauge ID Matrix for Pataha Creek Implementation Area

Gauge No.	Subbasin	Agency	Gauge ID	Location	Data Type	Period of Record
38	Pataha	WSU	Pataha 1	Pataha Creek near Mouth	Spot Flow Data	1998-2001; 2003
39	Pataha	WSU	Pataha 3	Pataha Creek near Pomeroy	Spot Flow Data	1998-2001; 2003
40	Pataha	WSU	Pataha 5	Pataha Creek (headwater area)	Spot Flow Data	1998-2001; 2003
41	Pataha	Ecology	35F050	Pataha Creek near Mouth	Telemetry	June 03-Present
42	Pataha	Ecology	35F100	Pataha Creek near Pataha	Manual Stage Height	June 03-Present

3.4.4 Water Quality

Elevated stream temperature, excessive fecal coliform concentrations and turbidity were the primary water quality concerns in Pataha Creek, as identified in the Level I Assessment. In addition, total suspended solids concentrations, turbidity, and high pH levels are also of concern as potential limiting attributes to salmonid rearing in the lower and middle portions of Pataha Creek. Pataha Creek has been identified as a major contributor of sediment to the Tucannon River.

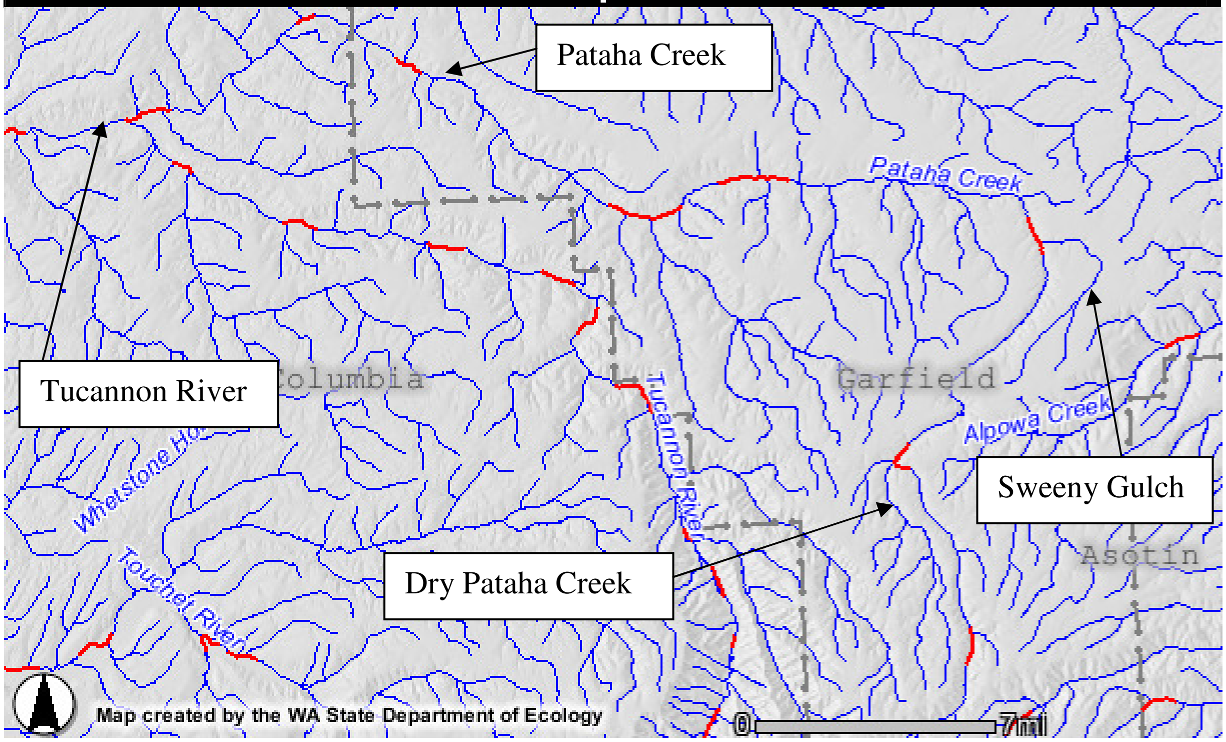
Table 3-11 shows the most recent 303(d) list of impaired water bodies released by Ecology. All waterbodies on the 303(d) list are classified as Category 5, meaning that Washington's state water quality standards have been exceeded, and there is no existing TMDL or pollution control plan. TMDLs are required for the water bodies in this category.

Table 3-11
2004 TMDL and 303(d) Listing Status in the Pataha Creek Implementation Area

Listing ID	WRIA	Water Body	Parameter	Category	TMDL Status
16797	35	Pataha Creek	Fecal Coliform	5	None
10455	35	Pataha Creek	Fecal Coliform	5	None
40550	35	Pataha Creek	Fecal Coliform	5	None
40551	35	Pataha Creek	Fecal Coliform	5	None
40548	35	Pataha Creek	Fecal Coliform	5	None
40549	35	Pataha Creek	Fecal Coliform	5	None
42532	35	Pataha Creek	Fecal Coliform	5	None
11141	35	Pataha Creek	pH	5	None
22436	35	Pataha Creek	Temperature	5	None
22437	35	Pataha Creek	Temperature	5	None
13847	35	Pataha Creek	Temperature	5	None
40531	35	Pataha Creek	Temperature	5	None
40528	35	Pataha Creek	Temperature	5	None
40530	35	Pataha Creek	Temperature	5	None
40529	35	Pataha Creek	Temperature	5	None

Pataha Creek is the only waterbody included on the 303(d) list. The locations of the water quality impairments in this IA are illustrated in Exhibit 3-12.

Exhibit 3-12
2004 303(d) Listed Waterbodies in the
Pataha Creek Implementation Area



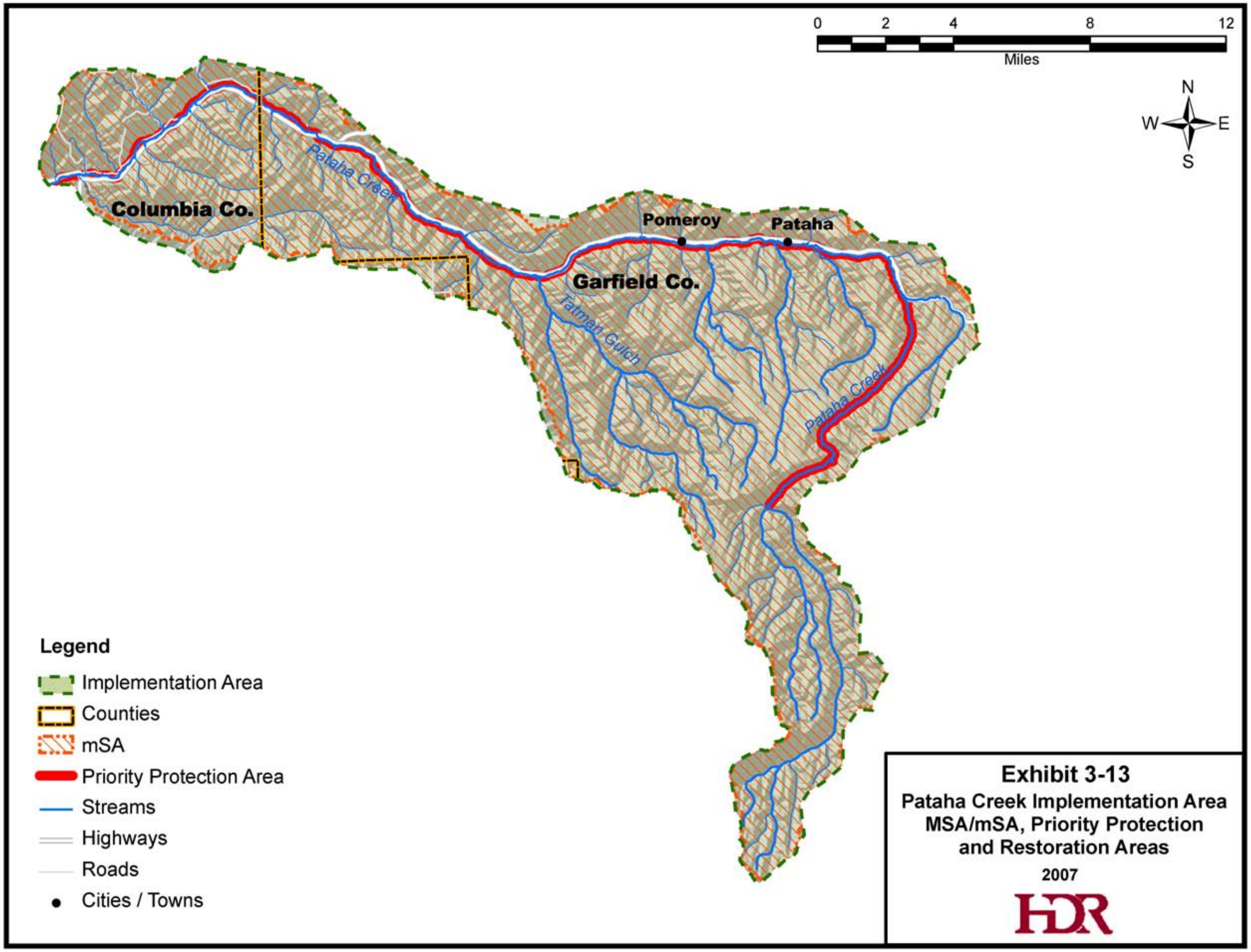
3.4.5 Aquatic Habitat

The SRSRP and subbasin plan has identified the following fish species as focal species within the Pataha Creek Implementation Area.

Snake River steelhead	*Oncorhynchus mykiss*
spring and summer Chinook	*Oncorhynchus tshawytcha*
bull trout	*Salvelinus confluentus*

The limiting attributes for these fish species were addressed in detail in the SRSRP and subbasin plan and are generally summarized by drainage area below. Limiting attributes for fish were determined using EDT. The EDT process and specific details regarding the analysis may be found in the SRSRP and subbasin plan.

Exhibit 3-13 shows MSA/mSA's and priority protection/restoration areas as described in the SRSRP (2006).


0 2 4 8 12
Miles
N
W E
S
Columbia Co.
Pataha Creek
Pomeroy
Pataha
Garfield Co.
Tatman Gulch
Pataha Creek
Legend
Implementation Area
Counties
mSA
Priority Protection Area
Streams
Highways
Roads
Cities / Towns
Exhibit 3-13
Pataha Creek Implementation Area
MSA/mSA, Priority Protection
and Restoration Areas
2007
HDR

Pataha Creek

Key habitat quantity and sedimentation are the primary limiting attributes for summer steelhead in Pataha Creek. Habitat diversity, flow, channel stability, predation, pathogens, and temperature are listed as strong secondary limiting attributes.

The EDT analysis showed the largest proportion of the impacts to spring/summer Chinook populations on the lower Tucannon is attributed to temperature, a lack of key habitat quantity, sedimentation, and a lack of habitat diversity. Channel stability, flow, food, pathogens, and predation had lesser impacts to Chinook habitat. The impact of temperature is most pronounced below the City of Pomeroy and impact the lower Tucannon Chinook population.

Migrating adults are partially blocked by the Delaney culvert on the lower Pataha and the 20th Street (Pomeroy) sewer line in lower Pataha Creek, and dams on Bihmaier and Dry Pataha creeks as well.

Causes of Impacts to Pataha Creek: Much of the sedimentation problem in Pataha Creek is attributable to historical forest management and to agricultural practices. A poorly designed road system in the Pataha watershed also increases erosion and does not provide adequate settling basins for runoff. Low habitat diversity is primarily caused by a lack of large woody debris, channel confinement, and poor riparian function. These attributes result from crop production, agricultural practices, grazing practices, decimation of beaver populations, past logging operations, a series of catastrophic floods, and development of the road system. Temperature problems are attributable to riparian damage upstream (reduced shading), low flows caused by hydrological disruption of the upper watershed, and to irrigation diversions.

The lower ten miles of Pataha Creek, from Dodge Junction to the Tucannon confluence, has downcut through 20 to 25 feet of fine sediments to expose raw bedrock. This downcutting is the result of historical overgrazing, as well as stream channelization designed to protect croplands within the floodplain.

Residential development also affects fish habitat in the Pataha drainage. City of Pomeroy roads and infrastructure are located within the floodplain. Within Pomeroy, significant portions of the streambank have been converted to vertical walls reinforced with concrete or riprap. The stream has been straightened and downcut, and there is no floodplain function.

3.5 Tucannon River Implementation Area

The Tucannon River Implementation Area is located along the western boundary of WRIA 35 and consists of all the tributaries to the Tucannon River except Pataha Creek. Pataha Creek is the largest tributary to the Tucannon River and is addressed as a separate implementation area. The Tucannon River drains 318 square miles within the IA, and enters the Snake River at RM 62.2. Most of the area is within Columbia County, with a small portion in Garfield County. The area is also within the Nez Perce Tribe and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) treaty territories. The area is rural, with a 2005 population of approximately 1,454. Approximately 11 percent of the population lives in the City of Starbuck.

The population is expected to remain constant through the year 2025. Landuses are primarily range and agricultural lands at lower elevations, higher elevations are mostly forested.

3.5.1 Historical, Current and Ongoing Watershed Activities

Local, state, and federal agencies, as well as tribes and landowners have been involved in watershed planning and implementation activities since the 1980s. Positive changes have been noted over time in watershed conditions due to these activities. Documentation of existing watershed restoration and recovery efforts has been made by the Columbia Conservation District. While not exhaustive, Table 3-12 demonstrates the extensive level of watershed activity in the IA. Exhibit 3-14 illustrates the approximate geographic distribution of existing Columbia Conservation District projects, as well as depicting the general types of projects completed.

Table 3-12
Tucannon River Watershed Planning and Implementation Activities, 1990s-Present

Date	Activity and/or Accomplishment
1996	1 sediment basin constructed; 3100 feet of riparian fence constructed; 1 pipeline installed for alternative livestock watering; 2 troughs constructed; 1 solar pump installed; 1 basin dike constructed; 160 feet of dike installed; 20 feet of drain pipe installed; 300 feet of drain tiles installed; 1 off-channel rearing structure established; 500 feet of dike removed; 2,685 feet of stream channel reshaped; 59 rootwads used for revetment material for streambank stabilization/rehabilitation; 38 rock barbs installed; 6 rootwads installed; 500 feet of sloped bank constructed; 1 spillway constructed; 9 vortexes constructed
1997	625 acres of direct seed planted; 67.9 acres stripcropped; 1096 feet of terrace reconstructed; 14,954 feet of riparian fence constructed; 400 feet of snags and riparian area cleared; 7,228 feet of fish stream improvements constructed; 400 feet of streambank protection measures taken; 1 irrigation system withdrawn from stream; 1,520 feet of stream rehabilitated with large woody debris; 1 log jam created for aquatic habitat; 2 off-channel rearing structures established; 1 spring channel preserved for off-channel rearing; 112 wads used as revetment material; 58 rock barb/rootwads installed; 200 feet of dike shaped; 6 vortexes constructed
1998	2509 acres of direct seed planted; 1.6 acres of grassed waterways constructed; 2859 feet of pipeline installed for alternative livestock watering; 1 spring development constructed; 2 troughs constructed; 125 riparian trees planted; 9,502 feet of fish stream improvements constructed; 1 cut-off trench constructed; 6 log barbs installed; 1 log jam constructed for aquatic habitat; 2 off-channel rearing structures established; 68 rootwads used as revetment material; 59 rootwads installed; 18 rock vanes installed; 15 vortexes constructed
1999	2749 acres of direct seed planted; 2 sediment basins constructed; 1.1 acres of grassed waterways constructed; 10,560 riparian trees planted; 6,486 feet of fish stream improvements constructed; 450 feet of streambank protection measures taken; 32 vanes installed; 4 large woody debris placements; 1 off-channel rearing structure established; 250 feet of revetment materials installed to reduce streambank erosion; 3 rock sills established; 114 rootwads installed; 9 vortex weirs installed
2000	1115 acres of direct seed planted; 75,076 riparian trees planted; 6,515 feet of fish stream improvements constructed; 13 vanes installed; 1,401 feet of stream rehabilitated with large woody debris; 1 log jam installed for aquatic habitat; 520 feet of revetment materials installed to reduce streambank erosion; 5 rootwads installed; 7 vortex weirs installed; 11 acres of riparian forest buffers established; 11 acres of riparian use exclusion established
2001	1332 acres of direct seed planted; 96 feet of upland fencing constructed; 1 spring development constructed; 48,275 riparian trees planted; 2,135 feet of fish stream improvements constructed; 8 vanes installed; 150 feet of stream rehabilitated with large woody debris; 1 log jam installed for aquatic habitat; 835 feet of revetment materials installed; 308 rootwads installed; 4 vortex weirs installed; 156 acres of forest riparian buffer established; 123 acres of riparian use exclusion established; 4 troughs constructed; 4 pipelines for alternative livestock watering constructed; 1 well drilled; 3,420 feet of riparian fencing installed; 9.9 acres of conservation cover established

Table 3-12
Tucannon River Watershed Planning and Implementation Activities, 1990s-Present

Date	Activity and/or Accomplishment
2002	887 acres of direct seed planted; 13.6 acres of conservation cover; 13.6 acres of filter strip planted; 380 feet of pipeline installed for alternative livestock watering; 3 wells drilled; 422 acres of riparian forest buffers established; 350 acres of riparian use exclusion established; 157,758 riparian trees/shrubs planted; 114.acres of conservation cover established; 2 spring developments established; 59,092 feet of riparian fencing constructed; 22 troughs constructed
2003	421 acres of direct seed planted; 13,215 feet of pipeline installed for alternative livestock watering; 7 troughs constructed; 3 wells drilled; 1188 acres managed for upland habitat; 32 meters installed; 31 fish screens installed; 292 acres of riparian forest buffer established; 292 acres of riparian use exclusion established; 29,635 riparian trees/shrubs planted; 23 acres of conservation cover established; 159 acres of upland wildlife habitat management measures implemented; 8,712 linear feet of mulching established; 27,071 feet of riparian fencing constructed. WDFW spring Chinook supplementation. Steelhead adult and juvenile trapping.
2004	17 flow meters installed; 17 fish screens installed; 21,065 trees and shrubs planted; 11.9 acres of grass seeded; 8,752 feet of fence installed; 7.888 cfs and 430.63 acre feet of water trusted for instream usage
2005	9,957 feet of pipeline installed for alternative livestock watering; 14 troughs constructed; 4 wells drilled; 11 flow meters installed; 11 fish screens installed; 16,065 feet of riparian fencing constructed; 1,410 acres of School Fire reseeded; 1.11 cfs and 96.25 acre feet water trusted for instream usage; 176.2 CREP acres contract for additional 5 years
2006	119.3 CREP acres contacted for additional 5 years; 1.0 cfs and 180.0 acre feet water trusted for instream usage; 6,975 trees planted; 83.5 acres riparian forest buffer established

Source: Columbia Conservation District, Personal Communication, 2006

Exhibit 3-14 Existing Conservation District Projects in the Tucannon Implementation Area

3.5.2 Water Quantity

The major categories of water use in the Tucannon River IA are major public water systems (City of Starbuck), small public water systems (Group B), self-supplied commercial/industrial users, individual household wells, and agricultural water users. Water used by the City of Starbuck represents a relatively small portion of the total water use in the area. The primary water use is associated with agriculture, such as crop irrigation and stock watering.

Surface and Groundwater Rights

Summaries of the types of use and associated quantities for surface and ground water permitted and certificated water rights were compiled as part of the Level 1 Assessment for this plan (HDR-EES, 2005). The types of use indicated in the water rights database for the Middle Snake IA includes:

- Consumptive: irrigation, stock watering, domestic, commercial/industrial, railway, fire protection, wildlife land management
- Non-consumptive uses: fish propagation

Water rights with irrigation being one of the purposes of use accounts for a majority of the total annual water rights allocated based on this review. Domestic and stock watering rights closely follow irrigation for quantity of water rights. The fish propagation right (groundwater) is also a significant water right (non-consumptive) in the Tucannon River IA.

Future Water Demand

Future water demand for municipal and residential use was calculated by using population forecasts (see Section 3.5), land use, and per capita demand and is presented in Table 3-13.

A 1995 study completed by the NRCS documented 1,941 acres of irrigated cropland located in the Tucannon River IA. Primary crops include grass hay, alfalfa hay, pasture, wheat and fallow land. Most water used for irrigation is derived from surface water sources. Annual irrigation values were calculated based on the estimated amount of water required for each crop and an average 65% irrigation efficiency. Agricultural activity and associated water use is anticipated to remain relatively constant over time.

Table 3-13 Average Annual Volume Projection for Domestic Water Use Tucannon River IA (acre feet per year)			
	City of Starbuck	Rural Columbia Co.	Rural Garfield Co.
1990	39	-	-
1995	38	-	-
2000	38	89	19
2005	38	87	19
2010	38	87	19
2015	38	87	19
2020	38	87	19
2025	38	87	19

3.5.3 Instream Flow

The instream flow recommendations specific to the Tucannon River IA were developed as described in the assessment documents listed in Section 2. Exhibit 3-15 shows the locations of the instream flow management points defined for the Tucannon River implementation area. These management points were used as part of the development of the instream flow management recommendations. Table 3-14 includes a list of gauge locations used in development of instream flow recommendations.

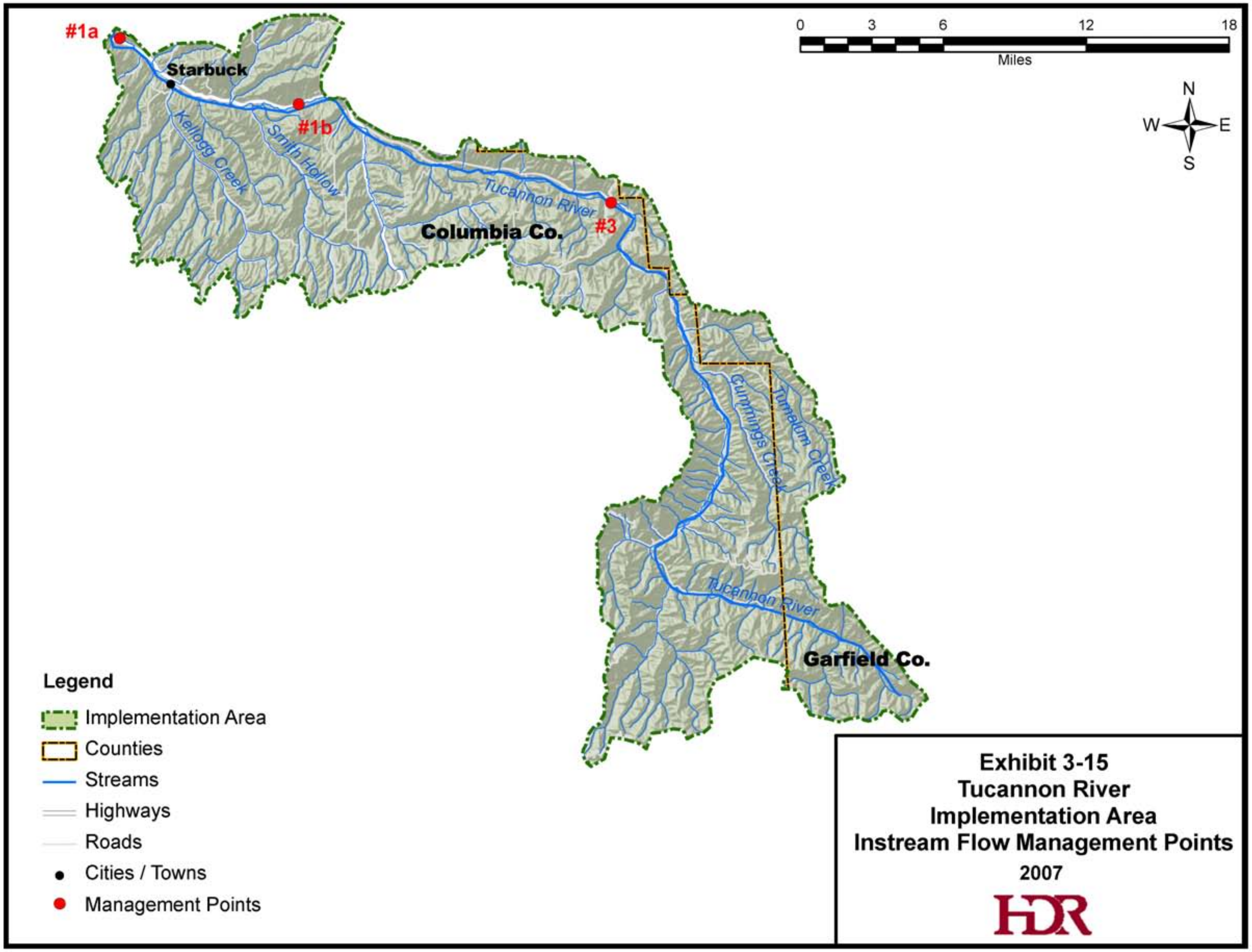

#1a
Starbuck
#1b
Kellogg Creek
Smith Hollow
Tucannon River
#3
Columbia Co.
Cummings Creek
Tumalum Creek
Tucannon River
Garfield Co.
0
3
6
12
18
Miles
N
W
E
S
Legend
Implementation Area
Counties
Streams
Highways
Roads
Cities / Towns
Management Points
Exhibit 3-15
Tucannon River
Implementation Area
Instream Flow Management Points
2007
HDR

Table 3-14

WRIA 35 Gauge ID Matrix for Tucannon River Implementation Area

Gauge No.	Subbasin	Agency	Gauge ID	Location	Data Type	Period of Record
43	Tucannon	WSU	TC6	Tucannon River at Cummings Creek Bridge (Spring Lake Campground)	Spot Flow Data	1999-2001
44	Tucannon	WSU	TC9	Tucannon River at Panjab Creek Bridge	Spot Flow Data	1999-2001
45	*Tucannon*	*WSU*	*TC4*	*Tucannon River at Marengo*	*Spot Flow Data*	*NOT IN LEVEL I*
46	Tucannon	USGS	13344500	Tucannon River near Starbuck	Daily Streamflow	1914-1917; 1928-1931; 1958-1990; 1994-Present
47	Tucannon	USGS	13344506	Kellogg Creek, Tributary No. 2 near Starbuck	Peakflow	1970-1978
48	Tucannon	USGS	13344508	Kellogg Creek, Tributary near Starbuck	Peakflow	1964-1969
49	Tucannon	USGS	13344510	Kellogg Creek, Tributary at Starbuck	Peakflow	1963-1964
50	Tucannon	USGS	13344000	Tucannon River near Pomeroy (Marengo)	Daily Streamflow	1913-1930
51	Tucannon	Ecology	35B150	Tucannon River near Marengo	Telemetry	June 2003-Present

3.5.4 Water Quality

The primary water quality issues identified in the Level I Assessment for the Tucannon River are elevated stream temperatures throughout the river and high fecal coliform concentrations near the mouth.

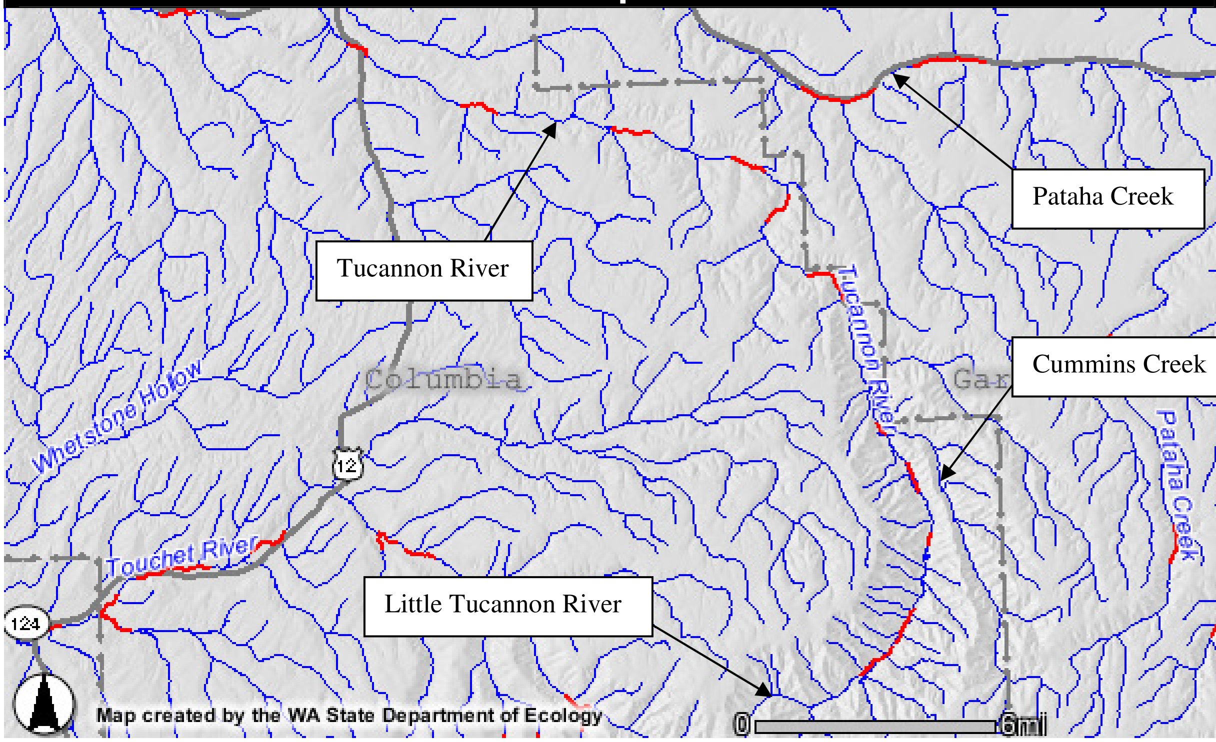
Table 3-15 shows the most recent 303(d) list of impaired water bodies released by Ecology. All waterbodies on the 303(d) list are classified as Category 5, meaning that Washington's state water quality standards have been exceeded, and there is no existing TMDL or pollution control plan. TMDLs are required for the water bodies in this category. Although no TMDLs have been completed, they are underway, the WRIA 35 Planning Unit has requested that Ecology begin the TMDL process for temperature in the Tucannon River in 2007.

Table 3-15
2004 TMDL and 303(d) Listing Status in the Tucannon River Implementation Area

Listing ID	WRIA	Water Body	Parameter	Category	TMDL Status
16800	35	Tucannon River	Fecal Coliform	5	None
16934	35	Tucannon River	pH	5	None
11144	35	Tucannon River	pH	5	None
11148	35	Tucannon River	pH	5	None
13855	35	Tucannon River	Temperature	5	None
13859	35	Tucannon River	Temperature	5	None
13984	35	Tucannon River	Temperature	5	None
13850	35	Tucannon River	Temperature	5	None
13853	35	Tucannon River	Temperature	5	None
13864	35	Tucannon River	Temperature	5	None
13849	35	Tucannon River	Temperature	5	None
13982	35	Tucannon River	Temperature	5	None
13983	35	Tucannon River	Temperature	5	None
13856	35	Tucannon River	Temperature	5	None
13857	35	Tucannon River	Temperature	5	None
13848	35	Tucannon River	Temperature	5	None
13861	35	Tucannon River	Temperature	5	None
3725	35	Tucannon River	Temperature	5	None
15918	35	Tucannon River	Turbidity	5	None
13865	35	Tucannon River	Temperature	5	None

The Tucannon River mainstem is the only waterbody included on the 303(d) list located within the WRIA 35 boundaries. The locations of the water quality impairments in this IA are illustrated in Exhibit 3-16.

Exhibit 3-16
2004 303(d) Listed Waterbodies in the Tucannon River Implementation Area



Tucannon River Temperature Study

The WRIA 35 Planning Unit set out to conduct a temperature study on the Tucannon River. The project objectives are outlined below:

- Review recent and historic data and studies to characterize temperature conditions in the river
- Perform field studies and analyses to identify and quantify heating and cooling processes in the river
- Develop and calibrate a computer temperature model to determine the sources of heat in the Tucannon River and to predict the temperature of the river that would occur with increased natural riparian shading assuming the current river morphology
- Evaluate differences in river temperatures between current and improved riparian shading during the "critical" period - low river flows and high temperatures

- Determine the potential benefits of riparian shading as a mechanism to decrease river temperature

In July 2005, HDR Engineering collected field data to develop the temperature model supporting the temperature assessment. The model is calibrated for a two-day time period in August. Data collected and analyzed include:

- River and tributary flow
- Ground water inflow/outflow
- River temperature
- River channel morphology
- Riparian vegetative cover and shade conditions
- Climate data

The program, QUAL2Kw (Pelletier and Chapra, 2003), was used to develop an analytical temperature model used to simulate water temperature in the Tucannon River by calculating the components of the heat budget and mass transfer process. The temperature model includes approximately 55 miles (88 kilometers) of the Tucannon River, from the mouth of the river to the river's confluence with Sheep Creek. Flow[2] and temperature data collected were used to calibrate the QUAL2Kw model. The calibrated model was then used to assess the effects of changes in riparian shade on Tucannon River temperatures. The following model scenarios were run:

- **Current Conditions** – The Current Conditions scenario represents current riparian vegetation (height, density, and overhang) and channel morphology. The calibrated model without changes represents this scenario.

- **Full Shade** – The Full Shade scenario represents the maximum (i.e., at full mature vegetation stage) effective shade that would naturally occur in riparian areas along the Tucannon River. Full Shade scenario results are often used by Ecology to establish "natural condition" temperatures for rivers when assessing compliance with water quality standards.

- **Full Shade in Forested Areas** – The Full Shade in Forested Areas scenario was used to assess the benefits from improved shade in the forested area only, upstream of RK 66 (RM 41) and to assess how conservative the Full Shade scenario compares to the existing forested conditions.

- **Topographic Shade** – The Topographic Shade scenario represents shading

[2] During July, the river experiences low-flow conditions at less than a 90 percent recurrence frequency.

from topography only. This scenario was used to assess the contribution that the current vegetation has on river temperatures.

- **No Withdrawals –** The No Withdrawals scenario is a model run without irrigation diversion to evaluate the relative effects of irrigation diversions on river temperature in the Tucannon River.

The results of this study indicate the following:

- The temperature field data collected for the Tucannon River in 2004 and 2005 indicate that water temperatures in the river are elevated and exceed current water quality standards.
- Existing vegetation reduces the daily maximum temperature by about 1 °C compared with un-shaded conditions.
- Improved riparian shading could lower water temperature by a maximum of 1 to 4 °C (2 to 7 °F) assuming that the riparian vegetation in the watershed could be restored to the full system potential. The least benefit would occur in the upper and lower watershed and the greatest benefit would occur in the middle watershed.
- The Full Shade scenario temperatures also indicate that even with increased riparian vegetation to the full system potential, water temperatures in the river would exceed Washington State water quality criteria up to RM 50.
- Irrigation diversions currently do not show an effect on river temperature because of the relatively small amount of water diverted as compared to the flow in the river.
- Current temperatures exceed the allowable increase above natural conditions (0.3 °C).
- The Full Shade results indicate the potential improvements to river temperature that are possible and could be considered in the development of temperature criteria for the Tucannon River.

Results of this study should be used in the development of a temperature TMDL as well as helping to determine attainable temperature for the Tucannon River and to assess the progress of restoration measures.

The field investigations methods, data collected and analyses are presented in the Tucannon River Temperature Study, posted at www.asotinpud.org/msww.

3.5.5 Aquatic Habitat

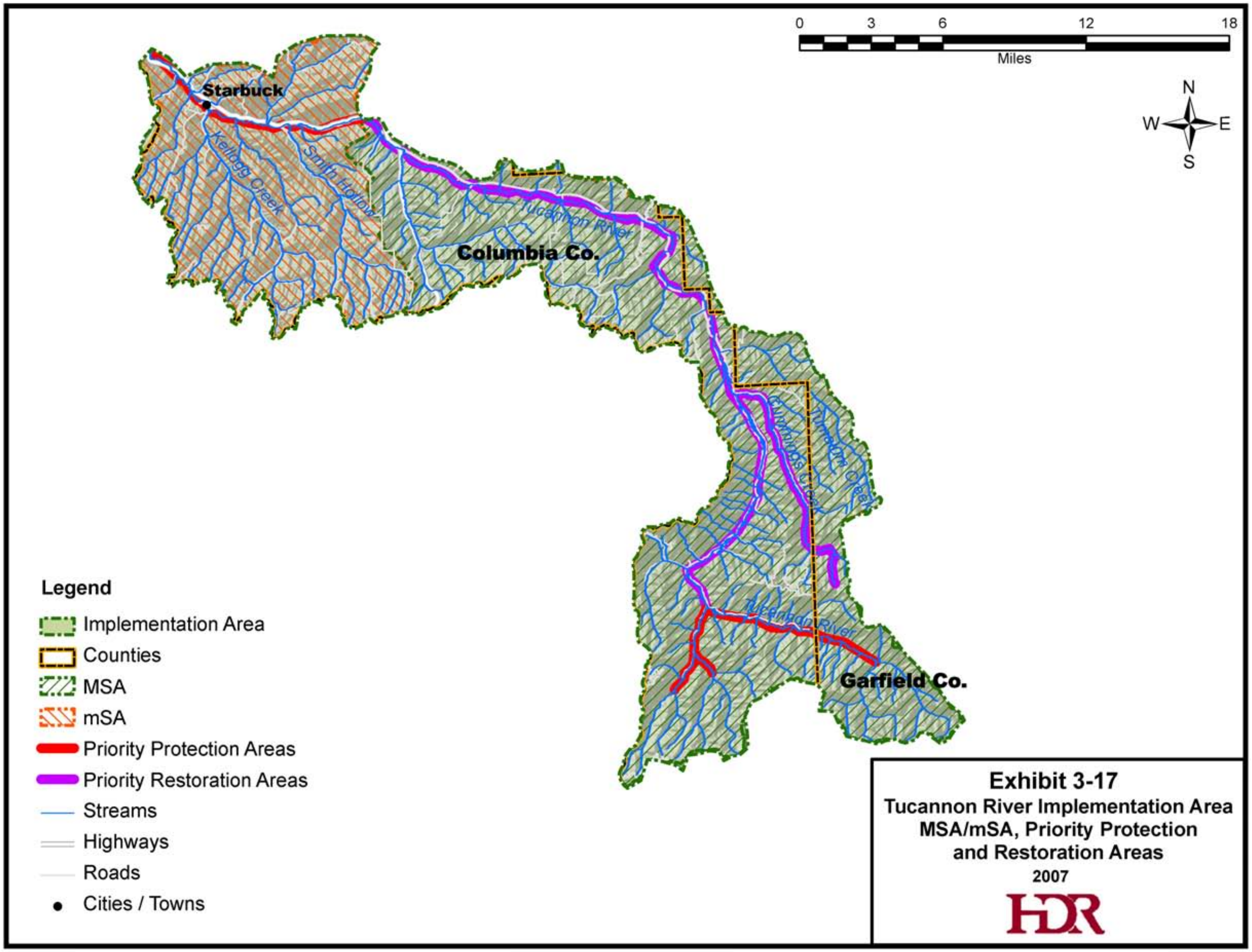
The SRSRP and subbasin plan has identified the following fish species as focal species within the Tucannon River Implementation Area.

Snake River steelhead	*Oncorhynchus mykiss*
spring/summer Chinook	*Oncorhynchus tshawytcha*
bull trout	*Salvelinus confluentus*
fall Chinook	*Oncorhynchus tshawytcha*

The limiting attributes for these fish species were addressed in detail in the SRSRP and subbasin plan and are generally summarized by drainage area below. Limiting attributes for fish were determined using EDT. The EDT process and specific details regarding the analysis may be found in the SRSRP and subbasin plan.

Exhibit 3-17 shows MSA/mSA's and priority protection/restoration areas as described in the SRSRP (2006).

The major attributes limiting the viability of the Tucannon River steelhead and spring/summer Chinook populations are high sediment loads, lack of large woody debris, anthropogenic (human caused) confinement, and reduced riparian function, and their impacts on habitat diversity, channel stability; key habitats (pools and pool tail-outs), summer water temperature, and flow.


0 3 6 12 18
Miles
N
W
E
S
Starbuck
Kellogg Creek
Smith Hollow
Tucannon River
Columbia Co.
Garfield Co.
Legend
Implementation Area
Counties
MSA
mSA
Priority Protection Areas
Priority Restoration Areas
Streams
Highways
Roads
Cities / Towns
Exhibit 3-17
Tucannon River Implementation Area
MSA/mSA, Priority Protection
and Restoration Areas
2007
HDR

Lower Tucannon River Mainstem (mouth to Pataha)

The EDT analysis showed that the largest proportion of the impact to spring/summer Chinook populations is attributed to temperature, a lack of key habitat quantity, and sedimentation, as well as lack of habitat diversity. Channel stability, flow, food, pathogens, and predation account for the smallest proportions. Although the EDT analysis indicates that flow is not a major impact to maintaining existing or increasing spring/summer Chinook populations, the Nez Perce Tribe and WDFW believe that reduced flows in summer contribute to sedimentation deposits, widening and shallowing of the stream (thus impacting habitat quantity and diversity), and increased temperatures (Kraynak, personal communication, 2006).

Causes of Impacts to the Lower Tucannon Mainstem and Pataha Creek: Much of the sedimentation problem in the lower Tucannon mainstem is attributable to agricultural practices along the lower Tucannon mainstem and in the Pataha Creek valley. This situation is exacerbated by a poorly designed road system in the Pataha watershed. Temperature problems are attributable to riparian damage upstream (reduced shading), low flows caused by hydrological disruption of the upper watershed, and upstream irrigation diversions. The lack of pools and pool tail-outs is caused by very low quantities of large woody debris and the filling of pools with transported sediment.

In 1997, WDFW built a new fish ladder at Starbuck Dam. The ladder is opened only from October through December to allow fall Chinook to pass. A notch cut in the center of the structure allows water to cascade through during the spring and summer. The intent of the notch and ladder is to allow upstream passage of adult salmon and steelhead in the spring and summer, but to block the passage of nongame fish. Adult salmon, steelhead, and bull trout are believed to be able to pass the dam, but there is concern that juvenile or subadult bull trout may not be able to pass.

Tucannon River Mainstem (Pataha to Marengo)

Key habitat quantity has been identified as the primary factor limiting steelhead production. Habitat diversity, flow, channel stability, channel morphology and stability, sediment, and temperature were identified as secondary limiting attributes. Primary limiting attributes for spring/summer Chinook are temperature, key habitat quantity, and habitat diversity; secondary attributes are flow, channel stability, sediment, and food availability.

Tucannon River Mainstem (Marengo to Little Tucannon River)

Habitat diversity and key habitat quantity are considered to be the primary limiting attributes for summer steelhead. Flow and channel stability are secondary limiting attributes. The poor habitat diversity in these areas is the result of poor riparian condition and a lack of large woody debris. Much of the key habitat impact is attributed to a lack of pools, which, in turn, are the result of channel straightening and the scarcity of large woody debris. Several minor limiting attributes for steelhead include competition with hatchery fish, pathogens, stream temperature, and harassment/poaching.

The dominant limiting attributes identified by EDT for spring/summer Chinook in this portion of the Tucannon River are a lack of habitat diversity and key habitat (pools). Secondary limiting attributes include temperature (the impact of which decreases substantially in the upstream reaches) and minor impacts attributable to channel stability, flow, and food.

Causes of Impacts to Tucannon River from Marengo to Little Tucannon: Anthropogenic degradations to habitat conditions in this area are similar to those occurring in the Tucannon mainstem from Pataha Creek to Marengo. In addition, recreational use has affected salmonid habitat in a number of ways in this area. Forest lands in this area receive a high level of recreational use; particularly in the National Forest's Wenaha Wilderness area and on WDFW lands. Because the uplands are dominated by steep slopes, most recreational use is concentrated in riparian areas. Nearly 400,000 visitors per year use the area for camping, fishing, hunting, wildlife viewing, and hiking in the wilderness area.

Tucannon River Mainstem (Little Tucannon to Bear Creek)

A lack of key habitat (primarily pools) is the dominant limiting factor for steelhead and spring/summer Chinook in the headwaters of the Tucannon River, with minor impacts attributable to channel stability and habitat diversity. The impacts of all limiting attributes in this area, as well as the Panjab Creek drainage were minimal. For both steelhead and spring/summer Chinook, the dominant limiting factor was a lack of key habitat attributable to a decrease from historical levels in the quantity of pools. Inadequate habitat diversity and channel instability also had minor impacts, as did a minimal increase in peak flows.

Causes of Impacts to Tucannon Headwaters: Habitat degradation in the Tucannon tributaries is primarily attributed to inadequate quantities of large woody debris which, in turn, are the result of access roads for timber harvest, trails and recreational usage. Stream and riparian damage occurred because logs were often moved downhill in stream channels and floodplains.

3.6 Grande Ronde Implementation Area

The Grande Ronde Implementation Area is the Washington portion of the Grande Ronde Subbasin, which is located in both northeastern Oregon and southeastern Washington. The area is bounded by the Washington – Oregon border to the south and WRIA 32 to the west, and drains approximately 340 square miles of southeast Washington. The primary drainages within Washington include Crooked, Wenatchee, Cougar, Cottonwood, Rattlesnake, Shumaker and Joseph creeks, as well as the Grande Ronde mainstem, which enters the Snake River at RM 169. Major jurisdictions within the area include Asotin County, Columbia County, Garfield County, DNR, BLM and the USFS. Land use in the area is largely centered on agricultural (irrigated and non-irrigated crops, and grazing), and timber harvesting within forested areas. The Grande Ronde IA is rural with no established urban areas; population in the year 2005 is approximately 558 and is expected to drop slightly to 515 by the year 2025 (HDR 2005n).

3.6.1 Historical, Current and Ongoing Watershed Activities

In 1992, the Northwest Power and Conservation Council (NPCC) selected the Grande Ronde river basin to be the site of Oregon's model watershed project. The Grande Ronde Model Watershed program (www.grmw.org) covers 5,265 square miles, primarily in Oregon, with a small portion in southeast Washington. While the majority of watershed restoration and recovery efforts for the basin have been implemented in Oregon, a few projects, noted below, have taken place in the Washington portion of the watershed. While not exhaustive, Table 3-16 demonstrates watershed activities in the Washington portion of the Grande Ronde Subbasin. Exhibit 3-18 illustrates the approximate geographic distribution of existing Asotin County Conservation District projects, as well as depicting the general types of projects completed.

Table 3-16
Grande Ronde Watershed Planning and Implementation Activities, 1990s-2005

Date	Activity and/or Accomplishment
1997	Restored, reconstructed and relocated trails on the Crooked Creek Trail and Smooth Ridge, in response to flood damage and trail deterioration
1998	Riparian exclosure fence constructed
1999	Riparian exclosure fence constructed
2000	Trail reconstruction/relocation, slopes and streambanks stabilized (Trails: Wenaha River, Wenatchee / Menatchee, Indian Tom, Hoodoo, Cross Canyon, Cat Track)
2001	Trail reconstruction/relocation, slopes and streambanks stabilized (Trails: Wenaha River, Wenatchee / Menatchee, Wenaha Beaver)
2001	CREP contracts on Rattlesnake Creek-200 acres.
2001	Cross fence constructed on Grouse Creek tributary and Sheep Creek
2002	Planted cropland to perennial grass
2003	CREP contracts on mainstem Grande Ronde and Cottonwood Creek-98.1 acres.
2003	Planted grazed land to pasture/hayland grasses
2003	Riparian exclosure fence and planting
2003	Riparian exclusion fence and planting; livestock water developments
2004	CREP contracts on Cottonwood Creek-34.5 acres.

Source:
Grande Ronde Basin Watershed Restoration Project Inventory, 6/29/05

Exhibit 3-18 Grande Ronde River Implementation Area Existing Conservation District Projects

3.6.2 Water Quantity

There are no urban areas in the IA. As a result, the primary water use categories include small public water systems, individual household wells, and agricultural water users. A public water system includes all systems except those serving only one single family residence. There are two groups of public water systems, Groups A and B. Group A water systems are defined as 15 or more connections or 25 or more people per day for 60 or more days per year. Group B water systems consist of less than 15 connections and less than 25 people for 60 or more days per year. The public water system used in this area is classified as Group B. However, irrigated agriculture and stock watering account for the largest portion of water use in the area.

Surface and Groundwater Rights

Summaries of the types of use and associated quantities for surface and ground water permitted and certificated water rights were compiled as part of the Level 1 Assessment for this plan (HDR-EES, 2005). The types of use indicated in the water rights database for the Middle Snake IA includes:

- Consumptive: irrigation, stock and wildlife watering, domestic, highway

Water rights with irrigation being one of the purposes of use accounts for a majority of the total annual water rights allocated based on this review.

Future Water Demand

Future demand for municipal and residential use was calculated using population forecasts (see Section 3.6), land use, and per capita demand and is presented in Table 3-17.

Table 3-17
Average Annual Volume Projection for Domestic Water Use In Grande Ronde Implementation Area
(acre feet per year)

Year	Asotin Co.	Columbia Co.	Garfield Co.	Grande Ronde IA Total
2000	54	68	39	160
2005	47	68	39	154
2010	54	68	39	160
2015	51	68	39	157
2020	46	68	39	153
2025	33	68	39	139

Estimated data taken from Ecology suggests the total irrigated acreage in this area is approximately 4,895 acres. Surface water diversions in this area are primarily taken from the Grande Ronde mainstem and Joseph Creek. Irrigable acreage is limited in the area and agricultural growth is expected to remain constant over time.

3.6.3 Instream Flow

The instream flow recommendations specific to the Grande Ronde implementation area were developed as described in the assessment documents listed in Section 2.
Exhibit 3-19 shows the locations of the instream flow management points defined for the Grande Ronde implementation area. These management points were used as part of the development of the instream flow management recommendations. Table 3-18 includes a list of gauge locations used in development of instream flow recommendations.

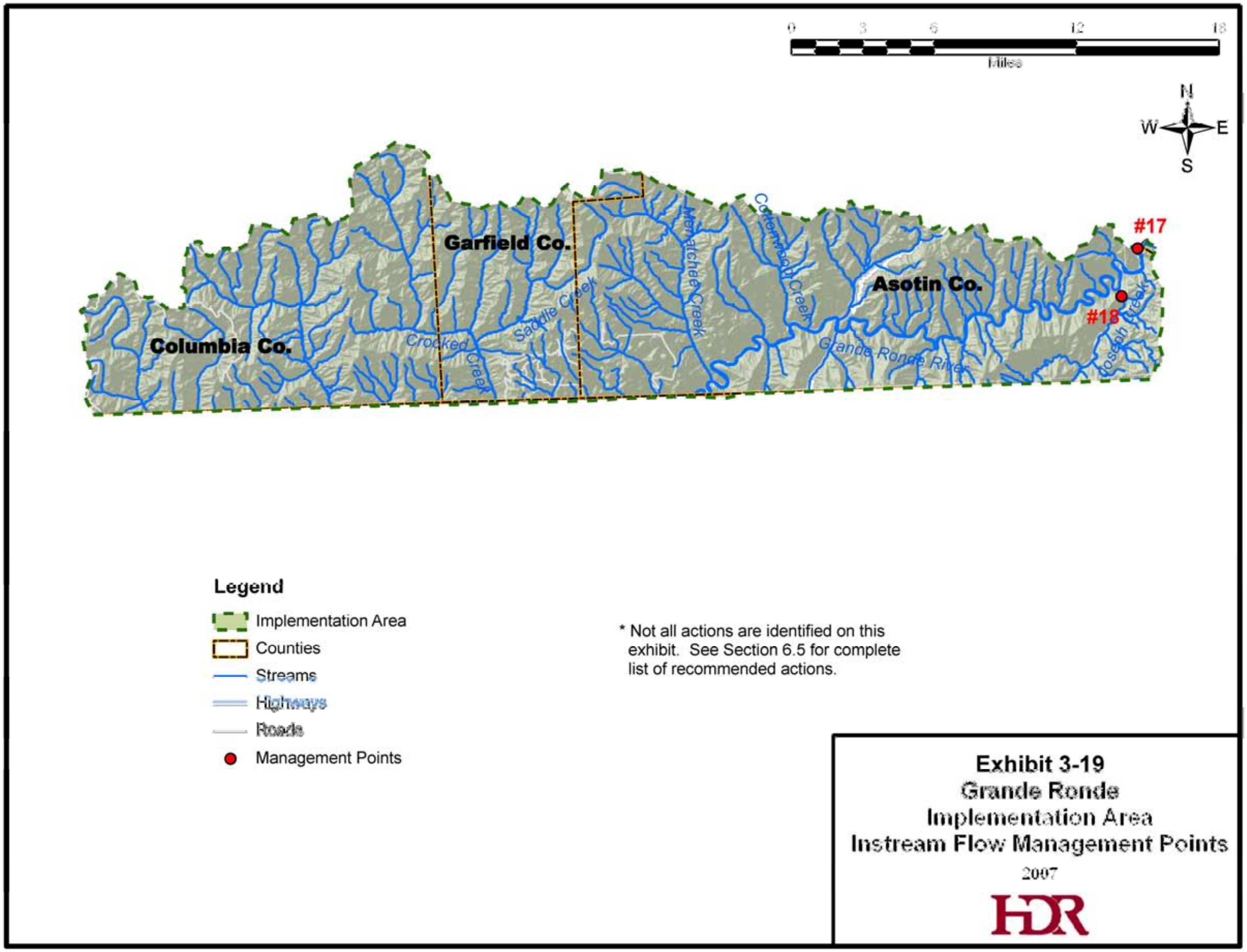


Exhibit 3-19
Grande Ronde Implementation Area Instream Flow Management Points
2007

Table 3-18

WRIA 35 Gauge ID Matrix for Grande Ronde River Implementation Area

Gauge No.	Subbasin	Agency	Gauge ID	Location	Data Type	Period of Record
52	Grande Ronde	USGS	13334000	Grande Ronde River at Zindel, WA	Daily Streamflow	1909-1911
53	*Grande Ronde (Oregon)*	*USGS*	*13333300*	*Grande Ronde River at Troy, WA (not on map)*	*Daily Streamflow*	*1944-2001*
54	Grande Ronde	Ecology	35G060	Joseph Creek Near Mouth	Telemetry	June 03-Present

3.6.4 Water Quality

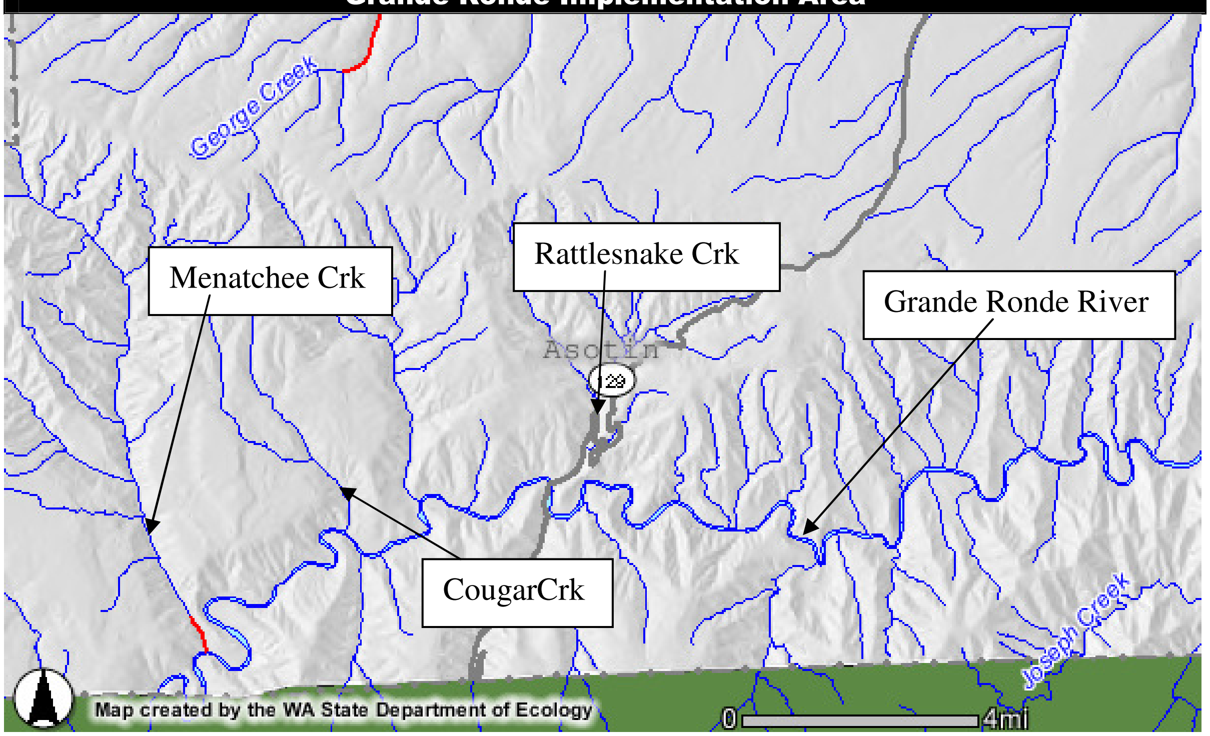
Most available water quality data in the Grande Ronde IA is focused on the Grande Ronde River mainstem. Specific water quality data from Ecology is not generally available for tributary streams other than temperature data from the mouth of Wenatchee Creek, which has been found to exceed state water quality standards. According to available data, the primary concerns for the Grande Ronde mainstem are elevated summer temperatures and suspended sediment.
Table 3-19 shows the most recent 303(d) list of impaired water bodies released by Ecology. All waterbodies on the 303(d) list are classified as Category 5, meaning that Washington's state water quality standards have been exceeded, and there is no existing TMDL or pollution control plan. TMDLs are required for the water bodies in this category, although no TMDLs have been scheduled for this IA at this date.

Table 3-19
2004 TMDL and 303(d) Listing Status in the Grande Ronde Implementation Area

Listing ID	WRIA	Water Body	Parameter	Category	TMDL Status
22431	35	Menatchee Creek	Temperature	5	None

Menatchee Creek is the only waterbody included on the 303(d) list. The locations of the water quality impairments in this IA are illustrated in 3-20.

Exhibit 3-20
2004 303(d) Listed Waterbodies in the Grande Ronde Implementation Area



3.6.5 Aquatic Habitat

The SRSRP and subbasin plan has identified the following fish species as focal species within the Grande Ronde Implementation Area.

Snake River steelhead	*Oncorhynchus mykiss*
spring and summer Chinook	*Oncorhynchus tshawytcha*
bull trout	*Salvelinus confluentus*

The limiting attributes for these fish species were addressed in detail in the SRSRP and subbasin plan and are generally summarized by drainage area below. Limiting attributes for fish were determined using EDT. The EDT process and specific details regarding the analysis may be found in the SRSRP and subbasin plan.

Exhibit 3-21 shows MSA/mSA's, and priority protection/restoration areas as described in the SRSRP (2006).

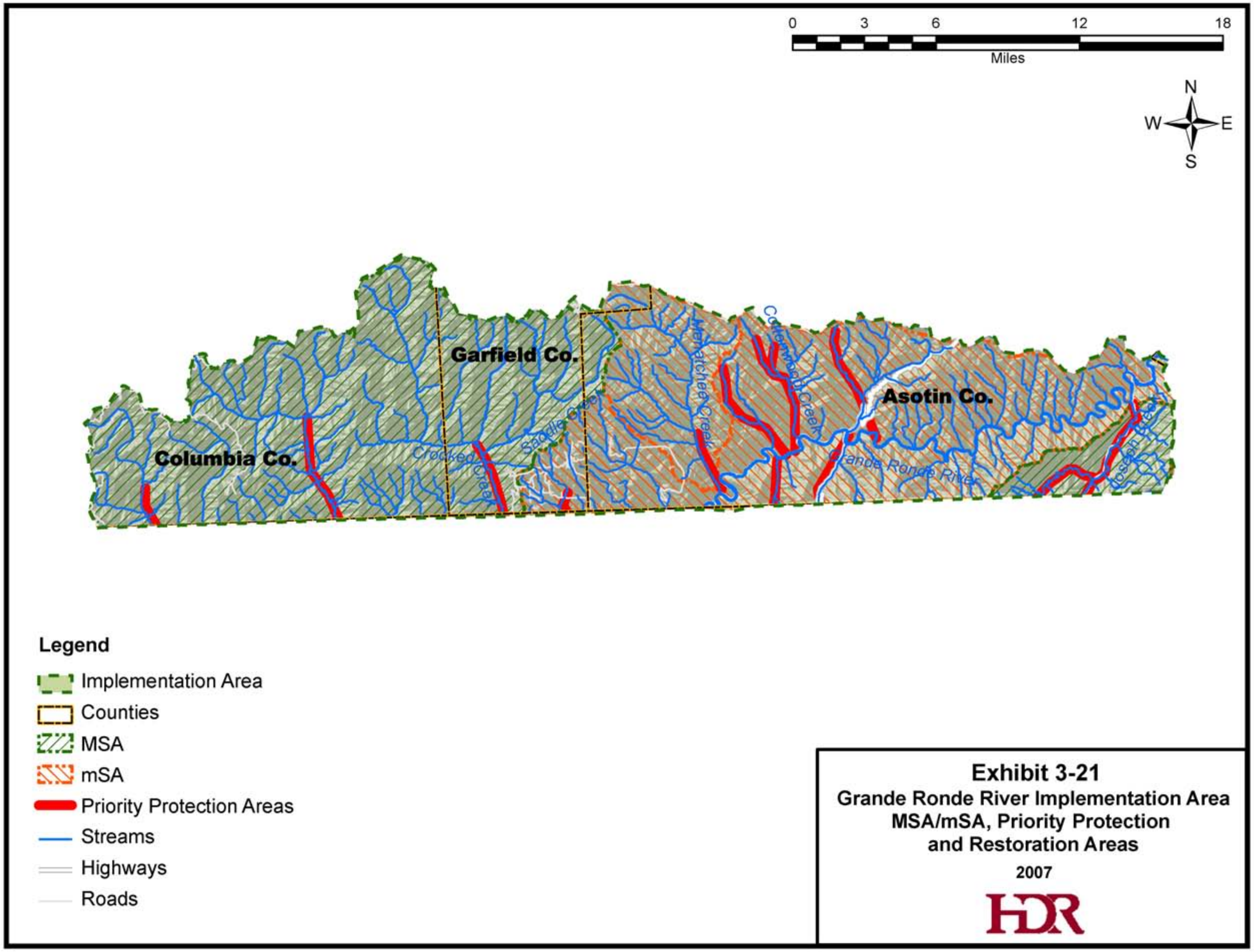


Exhibit 3-21
Grande Ronde River Implementation Area MSA/mSA, Priority Protection and Restoration Areas
2007

Lower Grande Ronde Mainstem and Tributaries (RM 38 to mouth)

In this area, the largest impacts are due to sedimentation and key habitat quantity (pools), with stream temperatures. Lesser impacts were attributed to habitat diversity, low flow, and fish pathogens. Specifically within the lower Grande Ronde River mainstem, the largest impacts affecting salmonids are attributable to a lack of habitat diversity and key habitat (pools), while sedimentation and temperature were the major impacts identified in most lower Grande Ronde tributaries. Sedimentation is the dominant limiting factor in lower Joseph Creek, with pathogens, predation, temperature, and a lack of key habitat (pools) as secondary impacts.

Causes of impacts to the Lower Grande Ronde: There is a lack of habitat diversity in the lower Grande Ronde mainstem primarily related to stream channelization, sedimentation from upstream sources, loss of floodplain connectivity, and a lack of large woody debris. Most of the sediment and temperature problems in Grande Ronde River tributaries are attributed to riparian degradation associated with roads situated next to streams, as well as riparian grazing. Sediment and other impacts affecting lower Joseph Creek are likely caused by upstream activities (in Oregon), and that actions taken strictly within Washington are unlikely to improve conditions.