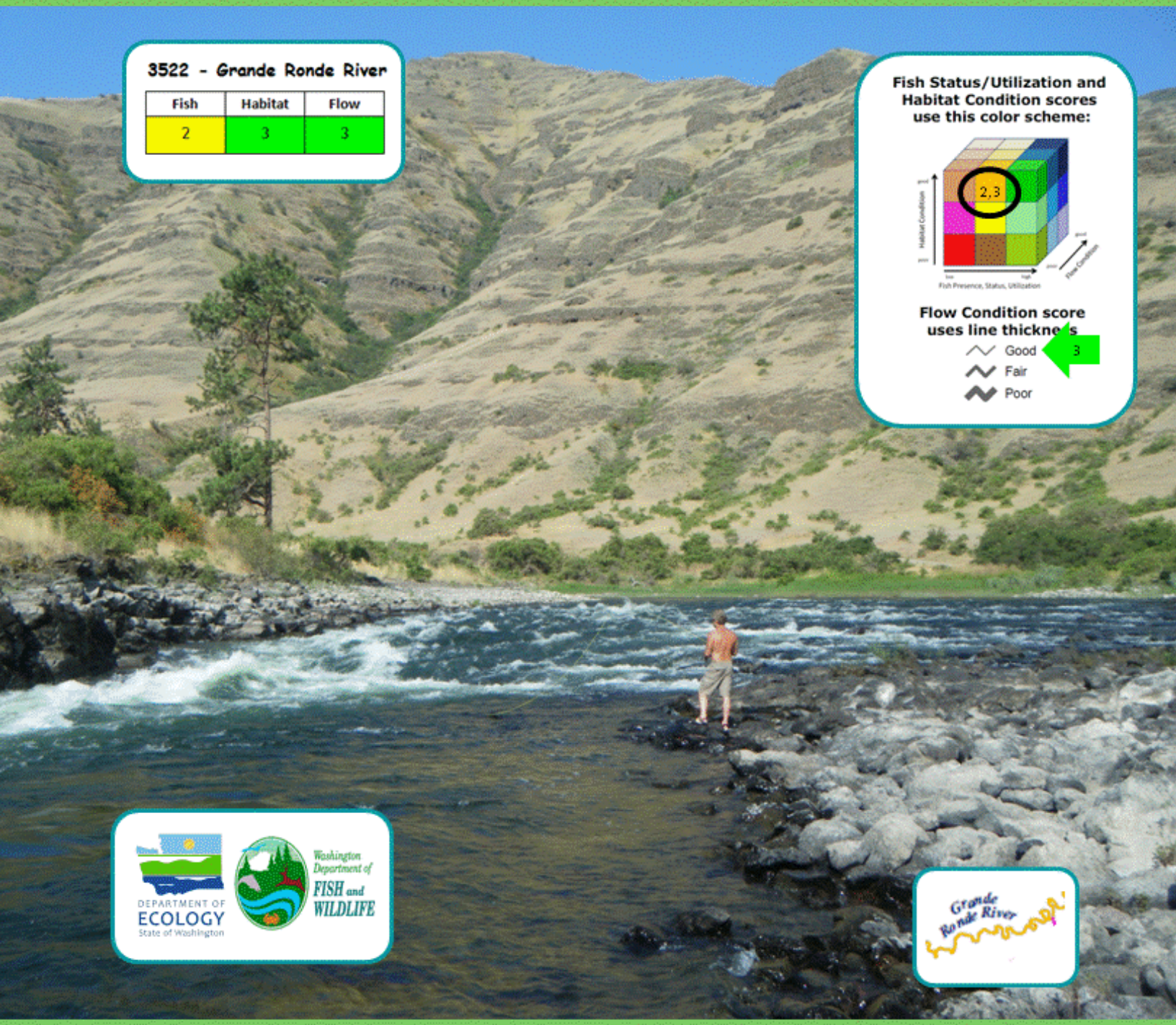
Columbia River Instream Atlas Project

Washington Department of Fish and Wildlife

Final Report – APPENDIX C

WRIA 35 MIDDLE SNAKE



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September 2011

Columbia River Instream Atlas Project - Final Report
Appendix C – WRIA 35 Middle Snake

September 23, 2011

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Columbia River Instream Atlas Project

Final Report

Appendix C - WRIA 35 Middle Snake

September 23, 2011

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1. Description

WRIA 35 – the Middle Snake River and its tributaries - drains about 2,250 square miles of southeast Washington. This WRIA begins at the confluence of the Snake River with the Palouse River (river mile 57.3), and terminates just upstream of the mouth of the Grande Ronde River where the Oregon, Washington, and Idaho borders meet (river mile 173.3).

Climate is generally arid to semi-arid in the summer and early fall. Winters are cold with moderate snowfall at low elevations and substantial snowfall in the Blue

Mountains. Basalt flows covered by a blanket of highly erodible loess soil are the dominant geologic feature of the region. Folding and faulting of bedrock and downcutting of streams have created numerous deep canyons throughout the drainage network. Vegetation in the Middle Snake River basin is characterized primarily by grasslands and agricultural lands with some ponderosa pine, shrub steppe, and wetland areas. This WRIA includes a portion of the Snake River mainstem and a number of its tributaries, including Asotin Creek, the Tucannon River, Deadman Creek, Almota Creek, Alpowa Creek, Penawawa Creek, and the Grande Ronde River. Little Goose Dam (RM70) and Lower Granite Dam (RM107) impound the Snake River in WRIA 35. The backwater from Lower Granite Dam extends upstream to the City of Asotin (RM146). The Snake River is free-flowing from this point up to Hells Canyon Dam (RM247) located upstream from the upper end of WRIA 35.

Approximately five percent of the Snake River's total watershed is located downstream of the Clearwater River at Lewiston, Idaho. This downstream portion is relatively arid compared to the Snake River's upper drainage areas. As such, only a small portion of the Snake River mainstem flow is derived from tributaries located within WRIA 35[1].

2. Reach Definitions

Reach delineation methodology in WRIA 35 varies by the functions and values reflected in the stream. The larger and lengthy streams tend to exhibit more reaches because of greater variability in flow quantity, geographic terrain, or instream habitat conditions. These are key values that determine the magnitude of biological benefits from flow supplementation. Smaller streams or major forks stand alone as a single reach because of the similarity of these respective functions and values within the entire reach. The largest stream, the Snake River is split into two major reaches; the Clearwater River confluence is the mid-boundary. The entire lower Snake River Reach 1, which starts at the lowest basin tributary confluence, the Palouse River, is inundated by reservoirs from the large dams, while the upper reach is mostly free flowing. The Tucannon River reach boundaries reflect changes in land use and habitat that include large farms in Reach 1, shrub steppe that turns into grasslands and transitional forest in Reach 2, and transitional forest that becomes National Forest land in Reach 3.

Most of watersheds that drain into the mainstem Snake River within the state of Washington all flow through agricultural lands. Even the upper Snake River and Grande Ronde tributaries pass through small farms and pastures before flowing into the larger river. Fish passage problems and loss of riparian result from the many culverts and pastures managed by the private landowners at the mouth of these streams. The upper Snake River and Grande Ronde tributaries drain from steep basalt hills, shrub steppe slopes, or transitional forest terrain that all have a long history of cattle grazing. The near surface basalt aquifers in these smaller streams provide the

1 Adapted from Northwest Power and Conservation Council 2005a, Northwest Power and Conservation Council 2005d, Northwest Power and Conservation Council 2005e and from the Snake River Limiting Factors Report (Washington Conservation Commission, 2002)

cool water that supports the entire steelhead life history, in some cases juvenile spring Chinook, and sporadically supports bull trout spawning and rearing.

Most of the major middle Snake River basin headwaters start in the National Forest lands. Farmers converted the lower reaches from historic arid grasslands or shrub steppe into wheat, alfalfa, apples, and pasture land. The upper reaches still retain the large woody debris (LWD), riparian, and floodplain connectivity values, while the transitional zones and the lower reaches are modified heavily and lack LWD, have reduced vegetation buffers, and the streams are often incised from channel straightening and a dysfunctional floodplain.

Reach descriptions are found in **Error! Not a valid bookmark self-reference.**.

Table C-1 Reach Definitions

Stream Name	Code	Stream Reach Description
Snake River Reach 1	3501	Palouse River (WRIA boundary) to Clearwater R
Snake River Reach 2	3502	Clearwater River to Oregon border
Tucannon River Reach 1	3503	Mouth to SR12
Tucannon River Reach 2	3504	SR 12 bridge to Turner Rd/SR 126 bridge, Marengo
Tucannon River Reach 3	3505	Turner Rd / SR 126 bridge to Panjab Creek
Pataha River Reach 1	3506	Mouth to Geiger Gulch in Pomeroy
Pataha River Reach 2	3507	Geiger Gulch in Pomeroy to USFS boundary
Asotin Creek Reach 1	3508	Mouth to George Creek
Asotin Creek Reach 2	3509	George Creek to Asotin Creek Forks
Charley Creek	3510	Mouth to WDFW boundary
Alkali Flat Creek	3511	Mouth to Little Alkali Flat Creek
Almota Creek	3512	Mouth to La Follette Rd
Alpowa Creek	3513	Mouth to headwaters
Penewawa Creek	3514	Mouth to Little Penewawa Creek
Deadman Creek	3515	Mouth to forks with Deadman Gulch & N Deadman Creek
North Deadman Creek	3516	Mouth to gulch upstream 1.1 mile
Deadman Gulch	3517	Mouth to gulch upstream 1.1 mile
Tenmile Creek	3518	Mouth to Montgomery Ridge Rd
Mill Creek	3519	Mouth to driveway bridge NE of Anatone
Couse Creek	3520	Mouth to Montgomery Gulch
Tumalum Creek	3521	Mouth to GIS RM 8
Grande Ronde River	3522	Mouth to Oregon Border
Buford Creek	3523	Mouth to Oregon Border
Menatchee Creek	3524	Mouth to falls
Joseph Creek	3525	Mouth to Oregon Border
Cottonwood Creek	3526	Mouth to Cottonwood Creek forks

Stream Name	Code	Stream Reach Description
Cougar Creek	3527	Mouth to Swank Springs
Rattlesnake Creek	3528	Mouth to gulch ≈ 1.5 miles past W Branch Rattlesnake Ck
West Branch Rattlesnake Ck	3529	Mouth to gulch at 1.4 miles

3. WRIA Results

Fish Status and Utilization

Components of the fish status/utilization score and ranking are SaSI status, ESA status, fish diversity and time spent in the reach for spawning/incubation, rearing/smolt migration and adult migration. TRT designation was not considered in this rating but is available on the spreadsheets for inclusion in future evaluations.

Nine salmonid stocks frequent this basin. They are Snake Fall Chinook, Tucannon Spring Chinook, Wenaha Spring Chinook, Tucannon Summer Steelhead, Asotin Creek Summer Steelhead, Lower Grande Ronde Summer Steelhead, Joseph Creek Summer Steelhead, bull trout, and Snake River Sockeye. This WRIA primarily acts as an adult and juvenile migration corridor for sockeye, with no spawning or rearing known to occur.

Historically, ESA threatened fall chinook spawning in the Washington portion of the Snake River was concentrated near the mouths of the Palouse and Clearwater Rivers. However, the majority of fall chinook spawning took place much higher in the watershed prior to construction of numerous dams from Hells Canyon upstream. The majority of mainstem fall chinook spawning occurs in the free-flowing reaches still remaining from Hells Canyon Dam downstream to the City of Asotin, WA. Limited fall chinook spawning also occurs in the tailraces of the four lower Snake River dams, and the lower portions of the Grande Ronde and Tucannon Rivers in Washington and the lower Clearwater River in Idaho. Fall chinook juveniles rear throughout the lower Snake River.

All the stocks in the Middle Snake River Basin are recognized by SaSI and ESA. Snake Fall Chinook is classified as threatened under ESA and critical by SaSI. The two stocks of spring Chinook are also classified as threatened by ESA but SaSI status for Tucannon Spring Chinook is critical and Wenaha Spring Chinook is unknown. All stocks of summer steelhead in the Snake River Basin are classified as threatened under the ESA, and SaSI considers two of these stocks depressed (Asotin Creek and Tucannon) and two stocks as unknown (Joseph Creek and Lower Grande Ronde). ESA and SaSi classify bull trout as threatened and unknown respectively. ESA has designated the Snake River Sockeye as endangered whereas the SaSI designation is critical.

The weighting factor (ESA and SaSI) for the each stock remains the same within the basin whereas the life histories and duration will change depending on the stream reach. SaSi status, and ESA listing will not be repeated for each stream reach.

Table C-2 SaSI Stock Name, Status, ESA Listing Unit, & Listing Status

SaSI Stock name	SaSI Status	ESA Unit Name	ESA Listing Status
Snake Fall Chinook	Depressed	Snake River Fall Run Chinook	Threatened
Tucannon Spring Chinook	Depressed	Snake River Spring and Summer Run Chinook	Threatened
Wenaha Spring Chinook	Unknown		
Tucannon Summer Steelhead	Depressed	Snake River Basin Steelhead	Threatened
Asotin Creek Summer Steelhead	Depressed		
Lower Grande Ronde Summer Sthd	Unknown		
Joseph Creek Summer Steelhead	Unknown		
Upper Tucannon Bull Trout	Healthy	Snake River Bull Trout	Threatened
Asotin Creek Bull Trout/Dolly Varden	Unknown		
Wenaha Bull Trout/Dolly Varden	Unknown		
Snake River Sockeye	Critical*	Snake River Sockeye	Endangered

Table C-3 Fish status & utilization periodicity for five life stages

Fish Species - SaSI Stock	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Snake Fall Chinook (ESA Threatened; 1 Critical SaSI Stock)	Adult In-Migration												
	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												
	Juvenile Out-Migration												

Fish Species - SaSI Stock	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Snake Spring Chinook (ESA Threatened; 1 Depressed, 1 Unknown, and 1 Extinct SaSI Stock)	Adult In-Migration												
	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												
	Juvenile Out-Migration												

Fish Species - SaSI Stock	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Snake Summer Steelhead (ESA Threatened; 2 Depressed, 2 Unknown SaSI Stocks)	Adult In-Migration												
	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												
	Juvenile Out-Migration												

Fish Species - SaSI Stock	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Snake Bull Trout (ESA Threatened; 2 Unk, 1 Healthy SaSI Stocks)	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												

Fish Species - SaSI	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Snake River Sockeye (ESA Endangered; No SaSI Stock)	Adult In-Migration												
	Juvenile Out-Migration												

Note: Stock presence varies by stream reach

- = No Use
- = Some activity or use occurring
- = Peak activity

Color / Bin Score
3 = High/Good
2 = Average / Fair
1 = Low / Poor

Table C-4 Fish status/utilization score & bin by stream reach

Reach Code	Reach Name	Prioritization Score	Normalized Score	Bin
3501	Snake River (Reach 1)	572	1.00	3
3502	Snake River (Reach 2)	411	0.72	3
3503	Tucannon River (Reach 1)	408	0.71	3
3504	Tucannon River (Reach 2)	340	0.59	2
3505	Tucannon River (Reach 3)	296	0.52	2
3506	Pataha Creek (Reach 1)	232	0.41	2
3507	Pataha Creek (Reach 2)	165	0.29	1
3508	Asotin Creek (Reach 1)	292	0.51	2
3509	Asotin Creek (Reach 2)	156	0.27	1
3510	Charley Creek	192	0.34	1
3511	Alkali Flat Creek	292	0.51	2
3512	Almota Creek	256	0.45	2
3513	Alpowa Creek	256	0.45	2
3514	Penawawa Creek	292	0.51	2
3515	Deadman Creek	256	0.45	2
3516	North Deadman Creek	84	0.15	1
3517	Deadman Gulch	84	0.15	1
3518	Tenmile Creek	256	0.45	2
3519	Mill Creek	36	0.06	1
3520	Couse Creek	256	0.45	2
3521	Tumalum Creek	240	0.42	2
3522	Grande Ronde River	317	0.55	2
3523	Buford Creek	148	0.26	1
3524	Menatchee Creek	148	0.26	1
3525	Joseph Creek	184	0.32	1
3526	Cottonwood Creek	148	0.26	1
3527	Cougar Creek	148	0.26	1
3528	Rattlesnake Creek	148	0.26	1
3529	West Branch Rattlesnake Creek	84	0.15	1

Habitat Condition

Little Goose Dam (RM 70) and Lower Granite Dam (RM 107) impound the Snake River in WRIA 35. The mainstem is highly influenced by those impoundments until about river mile 146 (city of Asotin), which is the upper extent of the backwater from Lower Granite Dam. Fish passage and water quality (temperature) are concerns in the mainstem.

Land use impacts associated with dryland agriculture, logging, flood control, concentrated recreational use of public lands, rural and recreational development, roads, and to a lesser extent irrigated agriculture have had significant negative effects on salmonid habitat in WRIA 35 tributary streams. Conversion of floodplains and riparian forest buffers to agricultural fields and residences, and channel modifications including straightening, dikes, and bank armoring, have dramatically altered the lower portions of the Tucannon River and Asotin Creek as well as smaller systems such as Alpowa and Deadman Creeks. Logging, conversion of perennial grasslands to annually planted dry cropland, and grazing have led to increased runoff and erosion of fine sediment throughout the region.

Habitat conditions are generally fair to poor on private lands in the lower portions of watersheds. Mid-elevation reaches are generally in fair condition, with patches of degradation. Conditions on public lands in headwater areas, particularly the Wenaha-Tucannon Wilderness Area are generally fair to good. Unfortunately headwater streams drain very steep portions of the Blue Mountains. The geology of these areas leads to naturally low numbers of pools and limited spawning gravel. The largest pools and significant levels of spawning gravel are generally found in the middle or lower portions of the watersheds where alterations of stream channels, removal of riparian vegetation, and surface water withdrawals (which exacerbate naturally low summer stream flows) have combined to increase water temperatures above the tolerance levels of salmonids. Fine sediment deposition is also a problem in these low gradient stream reaches.

Color / Bin Score
3 = High/Good
2 = Average / Fair
1 = Low / Poor

Table C-5 Habitat condition score & bin by stream reach

Reach Code	Reach Name	Prioritization Score	Bin
3501	Snake River (Reach 1)	9	1
3502	Snake River (Reach 2)	14	2
3503	Tucannon River (Reach 1)	13	2
3504	Tucannon River (Reach 2)	15	3
3505	Tucannon River (Reach 3)	17	3
3506	Pataha Creek (Reach 1)	7	1
3507	Pataha Creek (Reach 2)	14	2
3508	Asotin Creek (Reach 1)	13	2
3509	Asotin Creek (Reach 2)	15	3
3510	Charley Creek	15	3

Reach Code	Reach Name	Prioritization Score	Bin
3511	Alkali Flat Creek	8	1
3512	Almota Creek	16	3
3513	Alpowa Creek	14	2
3514	Penawawa Creek	8	1
3515	Deadman Creek	9	1
3516	North Deadman Creek	12	2
3517	Deadman Gulch	6	1
3518	Tenmile Creek	14	2
3519	Mill Creek	12	2
3520	Couse Creek	14	2
3521	Tumalum Creek	12	2
3522	Grande Ronde River	15	3
3523	Buford Creek	11	1
3524	Menatchee Creek	16	3
3525	Joseph Creek	14	2
3526	Cottonwood Creek	14	2
3527	Cougar Creek	15	3
3528	Rattlesnake Creek	11	2
3529	West Branch Rattlesnake Creek	11	2

Flow Condition

Much of the tributary area for this WRIA is groundwater influenced. Groundwater flows through cracks in basalt layers as well as the porous sediments sandwiched between the basalts. Fractured zones and sedimentary interbeds in the Columbia River Basalts carry considerable quantities of groundwater that supply water for irrigation and municipal use. Springs provide substantial flow to streams in areas where the channel has cut into a fractured layer of basalt.[2]

Forty-five percent (13) of this WRIA's 29 reaches are gauged and there are no WAC instream flow levels set within this WRIA. NHDPlus mean annual flow and mean August flow volume estimates were made available for each of these thirteen reaches. Water right diversions are recorded for all but five of WRIA 35's stream reaches.

Of the gauged Middle Snake tributary reaches, flow hydrographs are normative for most, although hydrographs for Almota, Alpowa, Deadman, Tenmile, and Couse

[2] Adapted from SALMONID HABITAT LIMITING FACTORS WATER RESOURCE INVENTORY AREAS 33 (LOWER) & 35 (MIDDLE) SNAKE WATERSHEDS, & LOWER SIX MILES OF THE PALOUSE RIVER, Final Report March 18, 2002, Mike Kuttel, Jr., Washington State Conservation Commission.

Creeks show some deviations. Peak flows are in April or May and minimum flows occur in August. Ten reaches are estimated or measured at 1 cfs or less in August.

Color / Bin Score
3 = High/Good
2 = Average / Fair
1 = Low / Poor

Table C-6 Flow condition score & bin by stream reach

Reach Code	Reach Name	Prioritization Score (Low is good)	Bin (High is Good)
3501	Snake River (Reach 1)	3	3
3502	Snake River (Reach 2)	2	3
3503	Tucannon River (Reach 1)	7	3
3504	Tucannon River (Reach 2)	7	3
3505	Tucannon River (Reach 3)	6	3
3506	Pataha Creek (Reach 1)	27	1
3507	Pataha Creek (Reach 2)	15	2
3508	Asotin Creek (Reach 1)	10	3
3509	Asotin Creek (Reach 2)	12	2
3510	Charley Creek	20	1
3511	Alkali Flat Creek	18	1
3512	Almota Creek	20	1
3513	Alpowa Creek	21	1
3514	Penawawa Creek	16	1
3515	Deadman Creek	24	1
3516	North Deadman Creek	32	1
3517	Deadman Gulch	28	1
3518	Tenmile Creek	15	2
3519	Mill Creek	24	1
3520	Couse Creek	12	2
3521	Tumalum Creek	16	1
3522	Grande Ronde River	3	3
3523	Buford Creek	12	2
3524	Menatchee Creek	9	3
3525	Joseph Creek	5	3
3526	Cottonwood Creek	16	1
3527	Cougar Creek	12	2
3528	Rattlesnake Creek	12	2
3529	West Branch Rattlesnake Creek	12	2

4. Reach Results

3501 -Snake River (Reach 1)

Fish	Habitat	Flow
3	1	3

Fish Status/Utilization

All nine stocks utilize Snake River (Reach 1) in some capacity leading to a high fish status/utilization rating. Most stocks utilize this reach for juvenile rearing and adult migration. Spawning occurs elsewhere. The exception is Snake Fall Chinook which utilizes the reach for spawning, rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Two of the four lower Snake River dams operate in Middle Snake River Reach 1. The dams inundated mainstem salmonid habitat throughout the entire reach. Instream habitat consists mostly of large reservoirs of slow moving water. There are limited shallow waters below each dam and at the mouth of the Palouse River that are used sporadically by fall Chinook for spawning.

Much of the shoreline is lined with levees and railroad infrastructure. Dryland agriculture is the dominant land use on ridge tops while livestock grazing dominates on the steep canyon slopes. Shoreline vegetation and tall canopy trees are sparse and contributes very little LWD to the instream habitat values.

Passage of salmonids through the lower Snake River dams and their associated reservoirs is a primary limiting factor on the Washington portion of the mainstem Snake River. Juvenile salmonid bypass systems and a transportation system of barges and trucks are currently operated at each dam. More than 50% of juvenile salmonids (up to 15 million) migrating down the lower Snake River are captured for transport. The reservoirs impounded by each dam have slowed river currents thereby increasing outmigration time of juvenile salmonids. The slow moving, warm water reservoirs also provide habitat for predatory species including northern pikeminnow, smallmouth bass, and channel catfish. Increased travel time and higher predator populations combine to reduce survival of juvenile salmonids in the lower Snake River.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 41,529 cfs Mean Annual Flow was used to score this reach. No recent gauge data were provided for Snake River Reach 1. Older USGS gauge data (1940-1972 average; Snake River at Clarkston, WA.) show minimum Mean Monthly Flows (MMFs) for this reach at around 14,200 in August 1940 and

maximum flows at 199,400 cfs in May 1957. The NHD+ estimated minimum August flow is 27% of the average; reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. Flows are highly regulated in this reach. Diversions evaluated for this project represent less than 1 percent of the Mean Annual Flow; reaches with diversions less than 5% of Mean Annual Flow scored 'good' for this scoring component.

Flow scoring detail is available on Table C-9.

3502 - Snake River (Reach 2)

Fish	Habitat	Flow
3	2	3

Fish Status/Utilization

Snake River (Reach 2) is also rated high for fish status/utilization. The seven stocks present utilize Snake River (Reach 2) for juvenile rearing and adult migration. Those stocks are Snake Fall Chinook, Wenaha Spring Chinook, Asotin Summer Steelhead, Lower Grande Ronde Summer Steelhead, Joseph Creek Summer Steelhead, bull trout and Snake River Sockeye.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Snake River Reach 2 terminates just above the mouth of the Grande Ronde River at the border between the states of Idaho, Oregon, and Washington. The reach is free flowing, although between the mouth of the Clearwater River and Asotin, the Lower Granite Pool effects begin to create slow deep moving reservoir waters. Above Asotin, the Snake River consists of large rapids, deep pools, and large islands. About half the shoreline areas are lined with residential units and recreational sites that are mostly setback behind a county road.

The riparian zones consist of woody shrubs, large basalt rock shorelines, and often shrub steppe to the waters' edge. There is very little side channel habitat. Several small streams that support steelhead populations and the larger Grande Ronde River enter into the Snake River in this reach. There is a significant increase in fall Chinook spawning throughout the entire reach above Asotin. All the salmon stocks use the mainstem as an adult and juvenile migration corridor, including the ESA Endangered sockeye population that migrates up into Idaho basins.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is around 17,800 cfs in August and the peak is 69,600 cfs in June. Minimum flow is 51 percent

of the average; reaches with August flows more than 66% of average scored 'good' for this component of the flow element score. Diversions evaluated for this project represent less than 1 percent of the Mean Annual Flow; reaches with diversions less than 5% of Mean Annual Flow scored 'good' for this scoring component.

Flow scoring detail is available on Table C-9.

3503 - Tucannon River (Reach 1)

Fish	Habitat	Flow
3	2	3

Fish Status/Utilization

Tucannon River (Reach 1) also has a high fish status/utilization rating. A different suite of seven stocks are present in Tucannon River (Reach 1) than Snake River (Reach 2). Two stocks, Snake Fall Chinook and Tucannon Summer Steelhead, utilize this reach for all three life cycle stages. Bull trout, and Tucannon Spring Chinook use the river for juvenile rearing and adult migration where as Wenaha Spring Chinook, Lower Grande Ronde Summer Steelhead, and Joseph Creek Summer Steelhead only use Tucannon (Reach 1) for juvenile rearing.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The Tucannon basin encompasses a 503-square-mile drainage area in Garfield and Columbia counties. Pataha Creek is the Tucannon's major tributary. The Tucannon River originates in the Blue Mountains and enters the Snake River at River Mile 62.2. The area has an average annual rainfall of 23 inches which includes winter snowfall. Melting snow from the Blue Mountains provides much of the annual runoff to the streams and rivers in the subbasin; the water level in many streams diminishes greatly during the summer months. Vegetation in the subbasin is characterized by grasslands and agricultural lands at lower elevations and evergreen forests at higher elevations. Approximately 75 percent of the Tucannon subbasin is in private ownership; most of this land is in the lower portion of the watershed

Large alders and cottonwoods dominate the riparian zone on this reach of the Tucannon River. Recovery of the riparian zones is continuous as farm activities, flooding, and grazing reduces the functional values. A riprapped railroad bed constructed in the 1880s runs from Pataha Creek to Smith Hollow. The dike keeps the river from cutting into the north valley wall, but does not constrain other processes. Post flood channel maintenance between 1937 and 1978 reduced the entire Tucannon River stream's length by seven to 20% and sinuosity reduced by 50%. Altering the system led to continual maintenance followed by more extensive flood damages, followed by more maintenance. Following the 1964-65 floods the (then) Soil Conservation Service (SCS) and the US Army Corps of Engineers (COE) installed up to

40,000 feet of riprapped levees along the Tucannon River (Reaches 1, 2, and 3 combined), while the state, county, and private parties installed between 20,000 and 40,000 additional feet of levees. Each road or rail crossing of the Tucannon River typically consists of a bridge and causeway that often extends the full width of the valley floor.

A fish ladder was installed at Starbuck Dam (RM 5.5) in 1992. The ladder is primarily used by fall Chinook and is designed to prevent northern pikeminnow and suckers from migrating from the Snake River reservoirs into the majority of the Tucannon River.

This reach of the Tucannon River is subject to high inputs of fine sediments eroded from crop land and transported through the drainage network, particularly Pataha Creek. Long periods between major flood events likely contributes to high embedded substrate ratios that make redd construction difficult and likely reduce survival of incubating juvenile salmonids. The bed of the Tucannon is composed primarily of coarse gravel and cobbles held together by a silt-clay matrix. Little sand or fine gravel are present.

Large woody debris is much less abundant than it was historically. Off-channel habitat is relatively common. Backwaters, side channels, and swampy areas are all present. Dissolved oxygen levels at some sites on this reach were low enough to preclude survival of juvenile salmonids. August water temperatures on this reach are high enough to stress juvenile salmonids. The majority of landowners on the lower 30 miles of the Tucannon River divert water from the river for irrigation.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 64 cfs in August and the peak is 304 cfs in May. Minimum flow is 37 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score. Diversions evaluated for this project represent 10 percent of the Mean Annual Flow; reaches with diversions between 5% and 15% of Mean Annual Flow scored 'fair' for this scoring component.

Flow scoring detail is available on Table C-9.

3504 - Tucannon River (Reach 2)

Fish	Habitat	Flow
2	3	3

Fish Status/Utilization

Four stocks utilize Tucannon River (Reach 2). Even though fewer stocks are present at this reach, three express all three life cycle stages. Those stocks are Snake Fall Chinook, Tucannon Spring Chinook, and Tucannon Summer Steelhead. The fourth

stock, bull trout utilizes the reach for juvenile rearing and adult migration. Between ESA and SaSI status and utilization, Tucannon River (Reach 2) is rated high for fish status/utilization.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The Tucannon River Reach 2 is a transition zone for several of the instream functions and values. The presence of rearing or staging juveniles and holding subadults and adults occurs throughout the reach but is very dependent on water quality, especially water temperature. Water temperatures are slightly cooler and more tolerant of salmonids than in the lower reach. All of the reach flows through farms, pastures, and crop lands. Most of the riparian values, side channels, and floodplain conditions noted in the Tucannon River Reach 1 also exist in Reach 2. There are very few tributaries that drain into this reach, except ephemeral drainages. Springs within the floodplain also contribute to some cool water refuge habitat values.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 63 cfs in September and the peak is 362 cfs in May. Minimum flow is 44 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score. Diversions evaluated for this project represent 12 percent of the Mean Annual Flow; reaches with diversions between 5% and 15% of Mean Annual Flow scored 'fair' for this scoring component.

Flow scoring detail is available on Table C-9.

3505 - Tucannon River (Reach 3)

Fish	Habitat	Flow
2	3	3

Fish Status/Utilization

Fish status/utilization for Tucannon River (Reach 3) is rated as ‘average’. Snake Fall Chinook are no longer utilizing the river at this reach. The remaining three stocks, Tucannon Spring Chinook, Tucannon Summer Steelhead and bull trout utilize the reach for spawning, rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The Tucannon River Reach 3 starts in USFS lands (close to the Tucannon-Wenaha Wilderness Area boundary) and flows downstream through a high recreational use area and then into farm lands that are scattered over the floodplain. Twenty-seven campgrounds, 16 on USFS lands, and 11 on the Wooten Wildlife Area are located along the Tucannon River. Except in the recreational areas, riparian zones are functional with tall canopy deciduous and evergreen trees, along with woody shrubs and some grasses. Large woody debris recruitment is on the increase as a result of major fires throughout the basin. Floodplain connectivity is healthy, except in areas where elevated roads are close to and parallel the river. Numerous ephemeral and several perennial streams flow out of the steep terrain into the Tucannon River in Reach 3. The only passage obstruction is the Tucannon Fish Hatchery adult collection weir. Outside of collection periods, all fish are able to pass upstream and downstream at the weir. Steelhead spawning can occur anywhere in the reach, but the majority takes place in the USFS zones. Spring Chinook utilize the middle to upper areas of Reach 3, and often move upstream of Reach 3 into the wilderness area to spawn. All life history phases of bull trout utilize this reach.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 114 cfs Mean Annual Flow was used to score this reach. Diversions evaluated for this project represent 3 percent of the Mean Annual Flow; reaches with diversions less than 5% of Mean Annual Flow scored 'good' for this scoring component.

Flow scoring detail is available on Table C-9.

3506 - Pataha Creek (Reach 1)

Fish	Habitat	Flow
2	1	1

Fish Status/Utilization

Pataha Creek (Reach 1) is a primary tributary to the lower Tucannon River mainstem. This reach is rated ‘average’ for fish status/utilization. Four stocks utilize this reach. Life Cycle stages for Snake Fall Chinook and Tucannon Spring Chinook are limited to juvenile rearing whereas bull trout utilize the reach for juvenile rearing and adult migration. Tucannon Summer Steelhead utilize Pataha Creek (Reach 1) for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Woody riparian plants on this reach consist primarily of shrubs growing on the floodplain forming in the bottom of the incised channel or the sides of the channel. Reed canary grass is the dominant riparian plant. Canopy cover ranges from 5% to 15%. Current practices of tilling to the edge of the terrace, grazing, and herbicide application are contributing to the degraded riparian conditions. In the lower portions, there are culverts that present partial fish passage barrier at some flows. No barriers are known to be present from Dodge to Tatman Gulch (RM 19). A concrete slab poured over a pipe at 20th Street in Pomeroy is impassable to most fish.

Extensive channel incision and the associated drop in ground water table, along with livestock grazing, land clearing, tillage, and herbicide use removed the majority of native woody trees and shrubs from banks along this reach. The channel modification coupled with conversion of thousands of acres of perennial grasslands to dryland wheat production led to rapid downcutting throughout the length of the stream channel. The historic floodplain became a terrace which no longer had a water table to support riparian vegetation.

Biologists found gravel and cobble substrate, boulders, and bedrock shelves throughout portions of this reach. Most rock surfaces were covered with a layer of silt. Gravel and cobble are often embedded to 100%. Very little LWD data is available, but LWD is suspected to be uncommon because of the highly degraded riparian conditions and channel incision. Little or no off-channel habitat is present because of channel incision.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 2 cfs in August and the peak is 37 cfs in April . Minimum flow is 19 percent of the average; reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. Flows are naturally low in this reach and get very low in summer months. Diversions evaluated for this project represent 21 percent of the Mean Annual Flow; reaches with diversions more than 15% of Mean Annual Flow scored 'poor' for this scoring component.

Flow scoring detail is available on Table C-9.

3507 - Pataha Creek (Reach 2)

Fish	Habitat	Flow
1	2	2

Fish Status/Utilization

Fish status/utilization for Pataha Creek (Reach 2) is low. The difference between Pataha Creek (Reach 2) and Pataha Creek (Reach 1) is the number of stocks present and the life cycle stages represented. Only two stocks are present in this reach. Those stocks, bull trout and Tucannon Summer Steelhead, utilize Pataha Creek (Reach 2) for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Cattle grazing is common and causes severe impacts throughout Pataha Creek Reach 2. Previous studies show almost no riparian vegetation was present from the Davis Farm to one mile below Columbia Center. Riparian vegetation is present from Columbia Center about one mile downstream and consists of grasses, forbs, and a variety of tall canopy trees. Canopy cover ranged from 5% to 37%.

Refuse dams just upstream from Columbia Street in Pomeroy may impede passage. Abandoned concrete slabs covered with mud and reed canary grass had formed a dam downstream from the well site for the town of Pataha. This dam appears to be impassable to all fish except at high flows. A bedrock shelf near the Clay Bar Ranch is likely a barrier at low flows, but is likely passable by steelhead during high spring flows.

Large portions of streambanks are eroding. The majority of the reach is characterized by an incised channel, particularly near Pomeroy. The stream has access to the floodplain, mainly in the upper portion of the reach where the channel is not incised. Gravel and rubble are the dominant substrate at Columbia Center. Biologists measured embeddedness at 55% with fine sediment covering 100% of all rock surfaces. Embeddedness tends to increase downstream. In some cases gravels and cobbles are completely obscured by mud.

Woody debris is very limited, almost non- existent on this reach. Channel incision makes off-channel habitat very rare. Bihmaier Spring provides a cool water influence just upstream from Benjamin Gulch Road.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 5 cfs in August and the peak is 40 cfs in April. Minimum flow is 34 percent of the average;

reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. Flows are naturally low in this reach and get very low in summer months. Diversions evaluated for this project represent 2 percent of the Mean Annual Flow; reaches with diversions less than 5% of Mean Annual Flow scored 'good' for this scoring component.

Flow scoring detail is available on Table C-9.

3508 - Asotin Creek (Reach 1)

Fish	Habitat	Flow
2	2	3

Fish Status/Utilization

Asotin Creek is a primary tributary to the Snake River above Tucannon River. Six stocks frequent Asotin Creek (Reach 1). Joseph Creek Summer Steelhead, Lower Grande Ronde, Wenaha Spring Chinook, and Snake Fall Chinook utilize the reach for juvenile rearing. Asotin Summer Steelhead is the only stock to use Asotin Creek (Reach 1) for all three life cycle stages. Bull trout express juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The Asotin Creek tributary comprises 325 square miles located in Asotin and Garfield Counties drained by Asotin Creek, Couse Creek, Tenmile Creek and their tributaries. Asotin Creek originates in the Blue Mountains and is a tributary to the Snake River, draining an area of 208,000 acres. Rainfall ranges from more than 45 inches in the higher elevations to 12 inches in the lower elevations. Melting snow from the Blue Mountains provides much of the annual runoff to the streams and rivers in the subbasin; the water level in many streams diminishes greatly during the summer months. Vegetation in the subbasin is characterized by grasslands and agricultural lands at lower elevations and evergreen forests at higher elevations. Approximately 67 percent of the Asotin basin is in private ownership; most of this land is in the lower portion of the watershed.

Conversion of perennial bunchgrass prairies to production of annual crops has led to widespread and massive quantities of fine sediment erosion and deposition in WRIA 35 streams. The majority of fine sediment deposition in the Asotin Subbasin occurs in the lower end of Reach 1 on private lands where other habitat features including riparian buffers, channel morphology, floodplain function, and instream structure are moderate to severely degraded. The riparian buffer along Asotin Creek Reach 1 is very constricted by development. Grazing leads to severe damage along the stream. No passage barriers are known on this reach. This reach is channelized and armored extensively to protect roads and private property. Cobble berms are often

constructed in some areas. The channelization and dike construction eliminated all floodplain connectivity on this short reach. Previous studies show high substrate embeddedness. Very little LWD is present and there is little potential for near-term recruitment because of channelization and the immaturity of trees found in the limited riparian buffer. Channelization and dikes eliminated the off-channel habitat.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 34 cfs in September and the peak is 223 cfs in May. Minimum flow is 35 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score. Diversions evaluated for this project represent 2 percent of the Mean Annual Flow; reaches with diversions less than 5% of Mean Annual Flow scored 'good' for this scoring component.

Flow scoring detail is available on Table C-9.

3509 - Asotin Creek (Reach 2)

Fish	Habitat	Flow
1	3	2

Fish Status/Utilization

Asotin Creek (Reach 2) also rates 'average' for fish status/utilization, but many of the stocks in Asotin Creek (Reach 1) no longer frequent the creek at this reach. Only two stocks remain, Asotin Creek Summer Steelhead and bull trout. Asotin Creek Summer Steelhead express all three life cycle stages in this reach whereas bull trout utilize the reach for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

In Asotin Creek Reach 2, the cycle of catastrophic floods, over grazing, flood control measures, and road building is a primary cause of the present degraded riparian condition. Asotin Road parallels the stream for the entire length of this reach. There is high substrate embeddedness in the pebble material from Charley Creek downstream, however, minimal cobble embeddedness. Large woody debris (LWD) levels increased substantially in recent years. Off-channel habitat is very limited but some is present. No dewatering occurs. About 90,390 acres (43%) of the entire Asotin Creek Watershed are used as pasture and rangeland. Livestock are wintered in canyon bottoms from December through March. Forests cover about 62,620 acres (30%) of the Asotin Creek Watershed. The majority of timberlands are found within the Umatilla National Forest. Summer flows average about 20 cfs.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 32 cfs in August and the peak is 165 cfs in May. Minimum flow is 49 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score. Diversions evaluated for this project represent 3 percent of the Mean Annual Flow; reaches with diversions less than 5% of Mean Annual Flow scored 'good' for this scoring component.

Flow scoring detail is available on Table C-9.

3510 - Charley Creek

Fish	Habitat	Flow
1	3	1

Fish Status/Utilization

Charley Creek is a tributary to Asotin Creek and rates 'average' for fish status/utilization. Like Asotin Creek (Reach 2), two stocks frequent the creek. Those stocks are bull trout and Asotin Creek Summer Steelhead. Both stocks utilize Charley Creek for spawning, rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The 1996 winter flood removed or damaged a large amount of riparian vegetation along Charley Creek, especially the lower reaches upstream from the mouth. Livestock grazing and channel incision with the associated drop in water table also contributes to riparian degradation. The stream is highly entrenched in places and banks are actively eroding as the stream attempts to recreate a floodplain. Cattle grazing activities leave very little bank cover and causes very unstable streambanks from the mouth to about RM 8. The majority of the lower five miles of Charley Creek lost access to the historic floodplain because of channel incision. The stream is confined between dikes from the Asotin Creek Road downstream to the mouth.

There is little information on fish passage. Embeddedness on the USFS portion of Charley Creek averaged 15.3% in 1993. Substrate is highly embedded downstream from the Asotin Creek Road. Large woody debris levels are poor throughout the reach. No off-channel habitat is present on Charley Creek. No artificial dewatering occurs on Charley Creek.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 5 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3511 - Alkali Flat Creek

Fish	Habitat	Flow
2	1	1

Fish Status/Utilization

Alkali Flat Creek is a primary tributary to the Snake River mainstem. Seven stocks frequent the creek, the majority of which utilize the creek for juvenile rearing. Those stocks are bull trout, Joseph Creek Summer Steelhead, Lower Grande Ronde Summer Steelhead, Asotin Creek Summer Steelhead, Wenaha Spring Chinook and Snake Fall Chinook. The exception is Tucannon Summer Steelhead which utilize the creek for spawning, rearing and adult migration. Alkali Flat Creek is rated 'average' for fish status/utilization.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Very little instream, riparian, and floodplain information is known about Alkali Creek, but there is a recent effort by various agencies to obtain more information. Periodically agency biologists survey Alkali Flat Creek for steelhead spawning. No spawning activity is documented. The lower reaches provide juvenile salmonid rearing and refuge habitat. Alkali Flat Creek is listed on the 303(d) list for high water temperatures at various locations along the creek.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 13 cfs Mean Annual Flow was used to score this reach. Diversions evaluated for this project represent 12 percent of the Mean Annual Flow; reaches with diversions between 5% and 15% of Mean Annual Flow scored 'fair' for this scoring component.

Flow scoring detail is available on Table C-9.

3512 - Almota Creek

Fish	Habitat	Flow
2	3	1

Fish Status/Utilization

Almota Creek is also a primary tributary to the mainstem Snake River. Fish status/utilization for the creek is rated as 'average'. Six stocks frequent Almota Creek. Asotin Creek Summer Steelhead utilizes the creek for all three life cycle stages. Snake Fall Chinook, Wenaha Spring Chinook, Lower Grande Ronde Summer Steelhead, Joseph Creek Summer Steelhead and bull trout utilize the creek for juvenile rearing.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Forbs and deciduous trees are the primary riparian vegetation on Almota Creek from the mouth to RM 1.0. Grasses, sedges, rushes, and deciduous trees are found on Almota Creek from RM 2.0 to RM 4.7. The riparian buffer averages 38 feet wide. The riparian vegetation upstream is degraded by intensive agriculture and roads. Portions of Almota Creek from RM 1.0 downstream did not have access to a floodplain. A floodplain is present from RM 2.0 to RM 4.7 on Almota Creek.

No fish passage barriers are known to exist on Almota Creek. Wild steelhead adults and redds are common in Almota Creek. Gravel and cobble are the dominant substrates on Almota Creek from RM 1.0 downstream. Embeddedness is generally 25 to 50% from RM 1.0 downstream and >25% between RM 2.0 and RM 4.7. No LWD is present on Almota Creek from RM 1.0 downstream, but small amounts are found between RM 2.0 and RM 4.7. No off-channel habitat is present on the lower mile of Almota Creek, but several side channels exist from RM 2.0 to RM 4.7.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is less than 1 cfs in summer months and the peak is 6 cfs in April. Minimum flow is 31 percent of the average; reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. Flows are naturally low in this reach and get very low in summer months. Diversions evaluated for this project represent 5 percent of the Mean Annual Flow; reaches with diversions equal to or less than 5% of Mean Annual Flow scored 'poor' for this scoring component.

Flow scoring detail is available on Table C-9.

3513 - Alpowa Creek

Fish	Habitat	Flow
2	2	1

Fish Status/Utilization

Six stocks frequent Alpowa Creek, a primary tributary to the Snake River mainstem. This creek is rated 'average' for fish status/utilization. Most of the stocks, Snake Fall Chinook, Wenaha Spring Chinook, Lower Grande Ronde Summer Steelhead, Joseph Creek Summer Steelhead and bull trout, utilize the creek for juvenile rearing. Asotin Creek Summer Steelhead use the creek for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Alpowa Creek is a fourth order tributary to the Snake River with its headwaters originating in the Blue Mountains, continuing east into the Snake River at Lower Granite Lake, about seven miles west of Clarkston, Washington. There is generally a large difference in elevation between the valley bottoms and the surrounding plateaus. Intermittent and/or ephemeral streams are present throughout the watershed.

Riparian degradation is a major limiting factor on Alpowa Creek. The alder, cottonwood, and willows form a narrow, but nearly continuous buffer from Stember Creek downstream to Alpowa Ranch. The riparian buffer from Alpowa Ranch to the mouth is patchy. No physical passage barriers are known above Stember Creek. Pomeroy Conservation District estimates that 10 surface water diversions are in use in the Alpowa Creek Watershed. The stream generally has access to the floodplain, but some reaches are incised.

Alpowa Creek continues to support numerous steelhead adults and redds, including wild stocks. Substrate above the Stember Creek confluence consists of an assortment of gravel, rubble, cobble, and boulders. In 1999 embeddedness was 50% with a layer of fine sediment covering all rock surfaces. Little LWD is present. Overgrazing and channelization damages or removes riparian vegetation that severely limits LWD recruitment.

Groundwater springs provide perennial flow to Alpowa Creek. Alpowa Creek is somewhat unique in the fact that the headwaters are not wooded like other streams in southeast Washington. The entire watershed is either grazed or farmed. The system is more "flashy" because of these land uses. Channelization and removal of woody riparian vegetation makes off-channel habitat rare on Alpowa Creek, but a few off-channel areas exist.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 5 cfs in July and the peak is 16 cfs in April. Minimum flow is 56 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score. Diversions evaluated for this project represent 96 percent of the Mean Annual Flow; reaches with diversions more than 15% of Mean Annual Flow scored 'poor' for this scoring component.

Flow scoring detail is available on Table C-9.

3514 - Penewawa Creek

Fish	Habitat	Flow
2	1	1

Fish Status/Utilization

Fish status/utilization at Penewawa Creek is also rated as 'average' and seven stocks frequent the creek. Tucannon Summer Steelhead is the only stock that utilizes Penewawa Creek for all three life cycle stages. The remaining stocks utilize the creek for juvenile rearing. Those stocks are Snake Fall Chinook, Wenaha Spring Chinook, Asotin Creek Summer Steelhead, Lower Grande Ronde Summer Steelhead, Joseph Creek Summer Steelhead and bull trout.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

No characterization or comments on habitat condition for Penewawa Creek are available.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 3 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3515 - Deadman Creek

Fish	Habitat	Flow
2	1	1

Fish Status/Utilization

Deadman Creek, a primary tributary to the mainstem Snake River, has an 'average' rating for fish status/utilization. The majority of the six stocks present utilize the creek for juvenile rearing. Those stocks are Snake Fall Chinook, Wenaha Spring Chinook, Asotin Creek Summer Steelhead, Lower Grande Ronde Summer Steelhead, and Joseph Creek Summer Steelhead. Tucannon Summer Steelhead is the only stock that expresses all three life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Deadman Creek and its tributaries flow from springs in the Palouse hills south of the Snake River. The stream flows into the Snake River at RM 83. Deadman Creek has no forestland as it meanders through mostly dryland farms. Deadman Creek is listed on the 303(d) list for excessive fecal coliform concentrations and high water temperatures along various segments of the creek. In addition, low pH and low dissolved oxygen concentrations may be of concern as potential limiting factors to salmonid rearing in Deadman Creek. Grazing and mechanical or chemical removal of vegetation are responsible for degraded riparian areas along Deadman Creek. Some mature deciduous trees are present, but the most are within the incised channel. Grasses, sedges, rushes, and a few small trees are the dominant riparian vegetation in portions of the upper reach. A large forest of willows is present from the mouth of Deadman Creek upstream to Willow Gulch.

Irrigation weirs and beaver dams obstruct fish passage in various portions of Deadman Creek. The historic floodplain connectivity is fragmented throughout and is dysfunctional on most of the incised reaches. In the incised reaches, the floodplain is used for agricultural production of wheat and alfalfa.

In the past, biologists documented several steelhead adults and redds in Deadman Creek. Cobble and gravel are the dominant substrate from RM 8.2 to RM 9.2. Mud and cobble are the dominant substrate from RM 1.5 to RM 4.5. Embeddedness is generally >50%. Little woody debris is present from RM 8.2 to RM 9.2. Woody debris is rare or absent from RM 1.5 to RM 4.5. Numerous side channels are present from RM 8.2 to RM 9.2. There is no off-channel habitat from RM 2.9 to RM 4.5. Some side channel habitat is present from RM 1.5 to RM 2.9

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 1 cfs in August and the peak is 6 cfs in April. Minimum flow is 36 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score. Diversion data used for this evaluation equal or exceed the Mean Annual Flow.

Flow scoring detail is available on Table C-9.

3516 - North Deadman Creek

Fish	Habitat	Flow
1	2	1

Fish Status/Utilization

Fish status/utilization for North Deadman Creek is rated as low. Only Tucannon Summer Steelhead is present in the creek, but this stock continues to express all three life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Mature deciduous trees dominate the lower ¼ mile of North Deadman Creek, but new recruitment is sparse. With the exception of a few scattered trees, little woody riparian vegetation is present up to a farmstead at the intersection of Guild City-Mayview and North Deadman Creek Roads. Farmers plant crops to the edge of the stream from this farmstead downstream to the buffer above the forks. Grazed pasture and small trees are the primary vegetation from RM 1.0 to RM 1.4 on North Deadman Creek. Shrub steppe is the dominant shoreline vegetation in the other areas. The surrounding area is dryland crops, although the landowners still maintain a dense vegetation buffer along this reach.

No fish passage barriers are found on North Deadman Creek from RM 1.0 to RM 1.4. North Deadman Creek also lacks floodplain access from RM 1.0 to RM 1.4. Gravel and rubble are the dominant substrates in both forks of Deadman Creek. Embeddedness is 26% in North Deadman Creek. A layer of fine sediment covers 100% of rock surfaces in both streams. Cobble is the dominant substrate in North Deadman Creek from RM 1.0 to RM 1.4. Embeddedness is usually >50%. There is no LWD in North Deadman Creek from RM 1.0 to RM 1.4. No off-channel habitat is found on North Deadman Creek from RM 1.0 to RM 1.4.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 2 cfs Mean Annual Flow was used to score this reach. Diversion data used for this evaluation exceed the Mean Annual Flow.

Flow scoring detail is available on Table C-9.

3517 - Deadman Gulch or South Deadman Creek

Fish	Habitat	Flow
1	1	1

Fish Status/Utilization

Fish status/utilization for Deadman Gulch is also rated as 'low.' Tucannon Summer Steelhead is the only stock present. This stock utilizes the gulch for spawning, rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Little or no woody riparian vegetation is present along South Deadman Creek, but a few mature deciduous trees are scattered along the stream adjacent to Guild City-Mayview Road. Forbs, grasses, sedges, and rushes are the primary riparian plants along South Deadman Creek from RM 0.8 to RM 1.5. The buffer averages 4 feet in width with no shading. The majority of South Deadman Creek from RM 0.8 to RM 1.5 does not have access to a floodplain.

Biologists located four fish passage barriers on South Deadman Creek from RM 0.8 to RM 1.5. No descriptions are available. Gravel and rubble are the dominant substrates in both forks of Deadman Creek. Embeddedness ranges from 10% to 33% in South Deadman Creek. Biologists found cobble and bedrock are the dominant substrates in South Deadman Creek from RM 0.8 to RM 1.5. Embeddedness is usually >25%. No woody debris is present on South Deadman Creek from RM 0.8 to RM 1.5. No off-channel habitat is found from RM 0.8 to RM 1.5 on South Deadman Creek.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 4 cfs Mean Annual Flow was used to score this reach. Diversions evaluated for this project represent 44 percent of the Mean Annual Flow; reaches with diversions more than 15% of Mean Annual Flow scored 'poor' for this scoring component.

Flow scoring detail is available on Table C-9.

3518 - Tenmile Creek

Fish	Habitat	Flow
2	2	2

Fish Status/Utilization

Tenmile Creek is another primary tributary to the mainstem Snake River. Fish status/utilization for this creek is rated as 'average'. Six stocks are present in Tenmile Creek. Bull trout, Joseph Creek Summer Steelhead, Lower Grande Ronde Summer Steelhead, Wenaha Spring Chinook and Snake Fall Chinook utilize the creek for juvenile rearing. Asotin Creek Summer Steelhead use the creek for spawning, rearing and adult migration life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Portions of the Tenmile Creek channel from RM 2 upstream go dry during the summer and early fall delaying or blocking adult steelhead migration and stranding both adults and juveniles in isolated pools. No other physical barriers are identified from RM 0.1 to RM 6.1. There may be passage barriers farther upstream. In the lower portion of Tenmile Creek riparian vegetation ranges from partial stands to no vegetation in areas of severe scour and flood deposition. The lower 1.5 to 2 miles of the stream is relatively dense riparian buffer in some areas, but portions are damaged by cattle grazing. Hawthorn, cottonwood, willows, and conifers are present in the upper portion of Tenmile Creek. Buffer width and conditions vary. Cobble berms and high banks restrict floodplain access from RM 0.1 to RM 0.7. Floodplain connectivity is fragmented due to incised channel zones and natural basalt canyon walls. There are no dikes or roads.

Cobble is the primary substrate from RM 0.1 to RM 3.7. Embeddedness is usually <25%. Embeddedness increases to 25 to 50% from RM 3.7 to RM 6.1. Woody debris is rare or non-existent from RM 0.1 to RM 6.1. Small amounts of LWD are present in the upper portions of Tenmile Creek. Little or no off-channel habitat is present. Some side channel habitat is present from RM 1.2 to RM 3.7. Tenmile Creek is one of the most productive steelhead streams for spawning and rearing that flow into this reach of the Snake River (RM 150). Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 1 cfs in July-October and the peak is 18 cfs in February. Minimum flow is 10 percent of the average; reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. The hydrographs for this reach appears to be truncated in March. The lowest MMFs are very low for this reach year-round. No

diversion data are available in this reach. Flow scoring detail is available on Table C-9.

3519 - Mill Creek

Fish	Habitat	Flow
1	2	1

Fish Status/Utilization

Mill Creek is a tributary to Tenmile Creek and is rated as 'low' for fish status/utilization. Only one stock is found in Mill Creek, Asotin Creek Summer Steelhead. This stock utilizes Mill Creek for juvenile rearing.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Tall grass and an occasional hawthorn are the primary riparian vegetation along Mill Creek near Anatone. Bank stability on Mill Creek ranges from active erosion to moderately stable. Several culverts on Mill Creek in the town of Anatone may be barriers. Mill Creek has moderate to heavy fine sediment levels with high turbidity at times. The gradient of Mill Creek is steep with small riffles and plunge pools. Summertime water temperatures can be tolerant of juvenile salmonids, although portions of Mill Creek do go dry during the summer.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 2 cfs Mean Annual Flow was used to score this reach. Diversions evaluated for this project represent 12 percent of the Mean Annual Flow; reaches with diversions more than 15% of Mean Annual Flow scored 'poor' for this scoring component.

Flow scoring detail is available on Table C-9.

3520 - Couse Creek

Fish	Habitat	Flow
2	2	1

Fish Status/Utilization

Six stocks frequent Couse Creek, a tributary to the Snake River mainstem. Fish status/utilization is average for this creek. Bull trout, Joseph Creek Summer Steelhead, Lower Grande Ronde Summer Steelhead, Wenaha Spring Chinook and

Snake Fall Chinook utilize the creek for juvenile rearing. Asotin Creek Summer Steelhead use the creek for spawning, rearing and adult migration life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Grasses, sedges, rushes, shrubs, and deciduous trees are the primary riparian vegetation along Couse Creek from RM 0.1 to RM 1.6. The riparian buffer averages 29 feet in width with a mean height of 7 feet. Further upstream to the bridge at Montgomery Gulch (RM 3.1) the riparian buffer is nearly nonexistent. A patchy buffer of scattered trees and shrubs is present from Montgomery Gulch upstream. The floodplain along Couse Creek is naturally small, although functional, because of the relatively narrow valley bottom.

Low flows caused by evaporation, drought, or subsurface flows restrict migration of juvenile salmonids or delay adult salmonid migration periodically. There are physical fish passage barriers (natural) on Couse Creek, including log jams and steep gradient. No surface water diversions are present on Couse Creek. Cobble and boulders are the dominant substrate. Embeddedness ranges from <25% to a high of 50%. Couse Creek consists of riffles that flow between the small plunge and lateral scour pools. Some large pools with cover are present, but not plentiful. Off-channel habitat is very limited. In past summers, Couse Creek went dry from about 1.5 miles above the mouth to 0.5 miles above the bridge at Montgomery Gulch. However, juvenile steelhead/rainbow trout were still found in isolated pools.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No Comments: Peak Mean Annual Flow in this reach is 6 cfs in April, and minimum flow is less than 1cfs in other months. Minimum flow is 34 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score. This is a small creek with a typical spring runoff and otherwise very low flows. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3521 - Tumalum Creek

Fish	Habitat	Flow
2	2	1

Fish Status/Utilization

Tumalum is a tributary to the mainstem Tucannon River. Fish status/utilization rating is ‘average’ for this creek with three stocks present. Bull trout and Tucannon Summer

Steelhead utilize the creek for spawning, rearing and adult migration. Tucannon Spring Chinook only utilize Tumalum Creek for juvenile rearing.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The Garfield County portion of upper Tumalum Creek has a riparian zone dominated by grand fir and alder with a grass and forb understory. Previous studies showed canopy cover for this reach averaged 66%. The Cummings Creek fire in 1961 burned the entire canyon of Tumalum Creek. Little vegetation was left to collect water and stabilize soil and streambanks when the 1964 flood occurred that caused massive destruction and erosion. Large sections of Tumalum Creek go subsurface during the summer months, causing a potential fish passage problem. No irrigation diversions are known to be in use on the Tumalum Creek. Average width to depth ratio for Tumalum Creek in 1993 on USFS lands was 10.9. Embeddedness in Tumalum Creek on USFS lands averages 32%. Tumalum Creek has moderate levels of LWD to help form pools, with an average of 18 pieces per mile. The middle and lower reaches of Tumalum Creek are intermittent.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 2 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3522 - Grande Ronde River

Fish	Habitat	Flow
2	3	3

Fish Status/Utilization

Fish status/utilization rating for Grande Ronde River is 'average.' This tributary to the mainstem Snake River has five stocks present. Of the five stocks, Snake Fall Chinook, and Lower Grand Ronde Summer Steelhead utilize the river for all three life cycle stages. Bull trout utilize the reach for juvenile rearing whereas Joseph Creek Summer Steelhead and Wenaha Spring Chinook rear and migrate in the reach.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Grasses and a few small shrubs are the dominant riparian vegetation along the majority of this reach. Limited riparian vegetation, large cobble substrate, and high

intensity flood events combined over time to create unstable banks. Riparian vegetation such as trees and shrubs is naturally limited by the narrow valley bottom and arid climate. The Grande Ronde flows through a very deep basalt canyon that constrains the channel. Because of this, floodplains are rare and generally small where present. A large amount of riprap is placed along roads paralleling the Grande Ronde River; otherwise floodplain access is not limited. No fish passage barriers are known to exist on the mainstem Grande Ronde within Washington.

Low summer flows and high water temperatures as well as high turbidity during high intensity runoff events may hinder migration. Substrate embeddedness is suspected to be a problem, but there is no data available. Logging and stream cleaning activities in the upper watershed within Oregon reduced LWD abundance from historic levels. Large pools are common and off-channel habitat is uncommon except along gravel bars and islands.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 4,784 cfs Mean Annual Flow was used to score this reach. Diversions evaluated for this project represent less than 1 percent of the Mean Annual Flow; reaches with diversions more than 15% of Mean Annual Flow scored 'poor' for this scoring component.

Flow scoring detail is available on Table C-9.

3523 - Buford Creek

Fish	Habitat	Flow
1	2	2

Fish Status/Utilization

Fish status/utilization for Buford Creek, a tributary to the Grande Ronde River, is low. Three stocks are present. Snake Fall Chinook and Wenaha Spring Chinook use the creek for juvenile rearing. In contrast Lower Grande Ronde Summer Steelhead utilize Buford Creek for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Buford Creek flows from the RB into the Grande Ronde River at RM 25.7. Channel gradients (up to 12%) typically limit anadromy to the lower few miles of the stream. The flood events of 1996-97 caused considerable damage to overstory vegetation in Buford Creek. The flood uprooted trees and caused severe downgrading within the existing stream channel. As a result, canopy coverage declined and is now patchy.

The increased solar radiation impacts the stream temperatures. Logging, wheat, and hay farming are land uses in the basin. Other habitat information is unavailable.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 3 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3524 - Menatchee Creek

Fish	Habitat	Flow
1	3	3

Fish Status/Utilization

Menatchee Creek is also a tributary to Grande Ronde River and has low fish status/utilization. Lower Grande Ronde Summer Steelhead utilize the creek for spawning, rearing and adult migration. Snake Fall Chinook and Wenaha Spring Chinook juveniles migrate to this reach for the rearing conditions.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Riparian buffers in lower Menatchee Creeks is in marginal condition. Cattle grazing near the mouth of Menatchee Creek cause some of the degradation. The stream has a very steep gradient. Floodplains are minimal in size. A falls near RM 1.5 on Menatchee Creek is a barrier to upstream migration. Embeddedness is not a problem on Menatchee Creek with an average value of only 8.4% on 5.5 miles of stream surveyed on USFS lands. Large wood is relatively plentiful on Menatchee Creek with an average of 40 pieces per mile reported on USFS lands. An average of 12.5 pools per mile was reported for Menatchee Creek on USFS lands. Pools on the USFS portion of Menatchee Creek are large, occupying an average of 43% of stream surface area. Turbulence, pocket pools, and rocks provided “good to excellent” fish cover. Side channels comprised an average of 5.25% of stream surface area on the USFS portion of Menatchee Creek.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 6 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3525 - Joseph Creek

Fish	Habitat	Flow
1	2	3

Fish Status/Utilization

Joseph Creek, another tributary to the Grande Ronde River, hosts four stocks in its waters. Joseph Creek Summer Steelhead display all three life cycle stages in the creek. The rest of the stocks, Snake Fall Chinook, Wenaha Spring Chinook, and Lower Grande Ronde Summer Steelhead, utilize Joseph Creek for juvenile rearing.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The 1996 flood scoured Joseph Creek a great deal but it is a naturally 'flashy' system. Joseph Creek is dominated by a relatively narrow buffer of deciduous trees about 20 to 30 feet in height from the mouth upstream to the end of the Joseph Wildlife Area. Ownership is split between national forest and private lands. Private ranching and grazing is the primary land use. Upper Joseph Creek has low gradient reaches passing through a mix of Forest Service and private lands. Lower Joseph below Cottonwood Creek is mostly in a confined canyon. Joseph Creek basin (includes tributaries) has 223 miles of steelhead spawning habitat. Sediment and temperature have the biggest impacts on instream habitat. High summer water temperatures limit salmonid use of lower Joseph Creek. Channel scouring, road construction impacts, and loss of flow from irrigation reduce instream juvenile rearing habitat values. There are suitable levels for gravels throughout the drainage for egg incubation, although marginal in places because of sediment impacts. Tributary reaches are likely the source of the identified sediment impacts. Information on other instream habitat functions is limited.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:Yes Rule:No The minimum of monthly mean flows in this reach is 18 cfs in August and the peak is 390 cfs in April. Minimum flow is 16 percent of the average; reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. Diversions evaluated for this project represent 2 percent of the Mean Annual Flow; reaches with diversions less than 5% of Mean Annual Flow scored 'good' for this scoring component.

Flow scoring detail is available on Table C-9.

3526 - Cottonwood Creek

Fish	Habitat	Flow
1	2	1

Fish Status/Utilization

Fish status/utilization in Cottonwood Creek is low. This tributary to the Grande Ronde River sports three stocks. Lower Grande Ronde Summer Steelhead spawn, rear and migrate in this reach. Snake Fall Chinook and Wenaha Spring Chinook use the creek for rearing.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Deciduous trees in a relatively contiguous buffer dominate riparian vegetation along the majority of Cottonwood Creek. Cottonwood Creek has a steep gradient and historically supported a very sparse marginal riparian vegetation community of willow and sumac. There is an intake structure for the juvenile fish acclimation facilities located at the mouth of Cottonwood Creek and an adult collection weir 600 feet further upstream. There are numerous cascades and boulders that are passable with difficulty. In the past, the average width of the stream was eight feet, average stream depth was 5 inches, average boulder banks were steep and from two to six feet high. The floodplain is about ¼ mile wide.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 1 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3527 - Cougar Creek

Fish	Habitat	Flow
1	3	2

Fish Status/Utilization

Cougar Creek fish status/utilization is low. This creek is also a tributary to the Grande Ronde River. Like Cottonwood Creek, Cougar Creek has three stocks present. Snake Fall Chinook and Wenaha Spring Chinook utilize the creek for juvenile rearing and lower Grande Ronde Summer Steelhead for spawning, rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

No characterization or comments on habitat condition for Cougar Creek are available.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 1 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3528 - Rattlesnake Creek

Fish	Habitat	Flow
1	2	2

Fish Status/Utilization

Three stocks frequent this tributary to the Grande Ronde River. Fish status/utilization for Rattlesnake Creek is low. Snake Fall Chinook and Wenaha Spring Chinook utilize the creek for juvenile rearing and lower Grande Ronde Summer Steelhead for spawning, rearing and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

Rattlesnake Creek is a tight steep draw with the access road running along side of it from the junction with the state highway up for just over one mile till the main access road climbs out of the canyon. Biologists conducted instream habitat surveys in Rattlesnake Creek as early as 1940 and more recently in the 1990's. Large increases to the stream width appear to reflect scour impacts from major flood events since the 1940's. The average width in the lower reaches changed from a 7-ft width to a 19-ft width. The riparian zone is wider in the lower 0.5 miles of the drainage and consists mostly of alder, sumac, some cottonwood, and invasive tree species. The adjacent lands are steep grassy hills used for grazing. The floodplain is narrow and is functional, although very little value exists because of the small footprint of the floodplain. The culvert under State Route 129 at Rattlesnake Creek may be a barrier. The upper reaches of Rattlesnake Creek are dominated by coniferous trees in the bottom of a steep canyon. The stream gradient is fairly steep. The instream habitat is dominated by large cobble, small boulders, and series of cascades. There is very little LWD, side-channel, and floodplain connectivity data available.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 2 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

3529 - West Branch Rattlesnake Creek

Fish	Habitat	Flow
1	2	2

Fish Status/Utilization

Lower Grande Ronde Summer Steelhead is the only stock present in the West Branch Rattlesnake Creek. The steelhead in this low fish status/utilization stream use West Branch Rattlesnake Creek for spawning, rearing, and adult migration.

Fish Status/Utilization scoring detail is available on Scoring Sheets

Table C-7.

Habitat

The West Branch Rattlesnake Creek flows through similar terrain as the lower mainstem Rattlesnake Creek. Cattle operations impact the riparian buffers, including fords that affect riffle areas. There is a fish passage obstruction in the lower end that is scheduled for restoration in 2012. Landowners claim that adult steelhead spawn in the lower one mile of the West Branch Rattlesnake Creek. Biologists observed juveniles rearing in the same stream reach. Instream water temperatures are cooled by groundwater seepage and surface springs throughout the drainage.

Habitat scoring detail is available on Table C-8.

Flow

Gauge:No Rule:No An NHD+ estimated 2 cfs Mean Annual Flow was used to score this reach. No diversion data are available in this reach.

Flow scoring detail is available on Table C-9.

Color / Bin Score
3 = High/Good
2 = Average / Fair
1 = Low / Poor

5. Scoring Sheets

Table C-7 Fish Scoring Sheet

Code	Reach Name	Reach Score & Bin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3501	Snake River (Reach 1)	572	41	41	41	56	40	56	60	49	49	49	45	45
3502	Snake River (Reach 2)	411	27	27	27	38	29	42	46	39	39	35	31	31
3503	Tucannon River (Reach 1)	408	29	32	32	40	33	36	37	33	33	37	33	33
3504	Tucannon River (Reach 2)	340	24	27	27	35	28	27	28	28	28	32	28	28
3505	Tucannon River (Reach 3)	296	23	26	26	30	27	26	23	23	23	23	23	23
3506	Pataha Creek (Reach 1)	232	16	19	19	23	20	23	20	20	20	20	16	16
3507	Pataha Creek (Reach 2)	165	12	15	15	15	12	15	12	15	15	15	12	12
3508	Asotin Creek (Reach 1)	292	21	24	24	28	25	28	25	25	25	25	21	21
3509	Asotin Creek (Reach 2)	156	12	15	15	15	12	15	12	12	12	12	12	12
3510	Charley Creek	192	15	18	18	18	15	18	15	15	15	15	15	15
3511	Alkali Flat Creek	292	21	24	24	28	25	28	25	25	25	25	21	21
3512	Almota Creek	256	18	21	21	25	22	25	22	22	22	22	18	18
3513	Alpowa Creek	256	18	21	21	25	22	25	22	22	22	22	18	18
3514	Penawawa Creek	292	21	24	24	28	25	28	25	25	25	25	21	21
3515	Deadman Creek	256	18	21	21	25	22	25	22	22	22	22	18	18
3516	North Deadman Creek	84	6	9	9	9	6	9	6	6	6	6	6	6
3517	Deadman Gulch	84	6	9	9	9	6	9	6	6	6	6	6	6
3518	Tenmile Creek	256	18	21	21	25	22	25	22	22	22	22	18	18
3519	Mill Creek	36	3	3	3	3	3	3	3	3	3	3	3	3
3520	Couse Creek	256	18	21	21	25	22	25	22	22	22	22	18	18
3521	Tumalum Creek	240	19	22	22	22	19	22	19	19	19	19	19	19
3522	Grande Ronde River	317	22	25	25	32	22	28	29	26	26	30	26	26
3523	Buford Creek	148	9	12	12	16	13	16	13	13	13	13	9	9
3524	Menatchee Creek	148	9	12	12	16	13	16	13	13	13	13	9	9

Code	Reach Name	Reach Score & Bin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3525	Joseph Creek	184	12	15	15	19	16	19	16	16	16	16	12	12
3526	Cottonwood Creek	148	9	12	12	16	13	16	13	13	13	13	9	9
3527	Cougar Creek	148	9	12	12	16	13	16	13	13	13	13	9	9
3528	Rattlesnake Creek	148	9	12	12	16	13	16	13	13	13	13	9	9
3529	West Branch Rattlesnake Creek	84	6	9	9	9	6	9	6	6	6	6	6	6
	Cumulative Monthly Total		471	549	549	662	544	646	588	566	566	574	491	491

Note: Reach names link to workbook tabs.

SaSI Stocks in Middle Snake River Basin	SaSI Stock Rating	Weight Factor**
Snake Fall Chinook	Depressed	3
Tucannon Spring Chinook	Depressed	3
Wenaha Spring Chinook	Unknown	2
Tucannon Summer Steelhead	Depressed	2
Asotin Creek Summer Steelhead	Depressed	2
Lower Grande Ronde Summer Sthd	Unknown	2
Joseph Creek Summer Steelhead	Unknown	2
Upper Tucannon Bull Trout	Healthy	2
Asotin Creek Bull Trout	Unknown	2
Wenaha Bull Trout	Unknown	2
Snake River Sockeye	Critical*	3

Weighting Factor Values by SaSI Stock Status:	Weight
Healthy	1
Depressed	2
Unknown	2
Critical	3

Weighting Factor for Federally Listed Species:	ESA Weight Factor
Assign additional weight to stocks that are listed as Threatened or Endangered under the ESA? (yes=1; no=0)	1
Assign additional weight to reaches within Interior Columbia TRT-designated spawning areas (MaSAs or MiSAs)? (yes=1; no=0)	0

Color / Bin Score
3 = High/Good
2 = Average / Fair
1 = Low / Poor

Table C-8 Habitat Scoring Sheet

Reach Code	Reach Name	Reach Score & Bin	Off Channel Habitat (OCHs)	Flood-plain Connec-tivity	Riparian Cond-ition	Spawning Suita-bility	Rearing Suita-bility	Passage Condi-tion
3501	Snake River (Reach 1)	9	2	1	1	1	2	2
3502	Snake River (Reach 2)	14	2	2	1	3	3	3
3503	Tucannon River (Reach 1)	13	2	2	2	2	2	3
3504	Tucannon River (Reach 2)	15	2	2	2	3	3	3
3505	Tucannon River (Reach 3)	17	3	2	3	3	3	3
3506	Pataha Creek (Reach 1)	7	1	1	1	1	2	1
3507	Pataha Creek (Reach 2)	14	2	2	2	2	3	3
3508	Asotin Creek (Reach 1)	13	2	2	2	2	2	3
3509	Asotin Creek (Reach 2)	15	2	2	3	3	3	2
3510	Charley Creek	15	2	2	2	3	3	3
3511	Alkali Flat Creek	8	1	1	1	2	2	1
3512	Almota Creek	16	2	2	3	3	3	3
3513	Alpowa Creek	14	2	1	2	3	3	3
3514	Penawawa Creek	8	1	1	1	2	2	1
3515	Deadman Creek	9	1	1	1	2	2	2
3516	North Deadman Creek	12	2	2	2	2	2	2
3517	Deadman Gulch	6	1	1	1	1	1	1
3518	Tenmile Creek	14	2	2	2	3	3	2
3519	Mill Creek	12	2	2	2	2	2	2
3520	Couse Creek	14	2	2	2	3	3	2
3521	Tumalum Creek	12	2	2	2	2	2	2
3522	Grande Ronde River	15	3	2	2	3	2	3
3523	Buford Creek	11	2	2	2	2	2	1
3524	Menatchee Creek	16	2	2	3	3	3	3
3525	Joseph Creek	14	2	2	2	2	3	3
3526	Cottonwood Creek	14	2	2	3	3	3	1
3527	Cougar Creek	15	2	2	3	3	3	2
3528	Rattlesnake Creek	11	2	2	2	2	2	1
3529	West Branch Rattlesnake Ck	11	2	2	2	2	2	1

Color / Bin Score
3 = High/Good
2 = Average / Fair
1 = Low / Poor

Table C-9 Flow Scoring Sheet

Reach Code	Reach Name	GOOD IS HIGH BIN	POOR IS HIGH, GOOD IS LOW >>>>>>>>>>>>>>>>>>> Sum scores (A:D) * E	A % of Mo Avg Below Rule	B Qi Deviation	C No. Claims	D August Deviation from Mean Annual Flow	E Flow Volume Factor
3501	Snake River Reach 1	3	3		1	2	2	0.5
3502	Snake River Reach 2	3	2		1	1	2	0.5
3503	Tucannon River Reach 1	3	7		2	3	2	1.0
3504	Tucannon River Reach 2	3	7		2	3	2	1.0
3505	Tucannon River Reach 3	3	6		1	3	2	1.0
3506	Pataha River Reach 1	1	27		3	3	3	3.0
3507	Pataha River Reach 2	2	15		1	2	2	3.0
3508	Asotin Creek Reach 1	3	10		1	2	2	2.0
3509	Asotin Creek Reach 2	2	12		1	3	2	2.0
3510	Charley Creek	1	20		0	2	3	4.0
3511	Alkali Flat Creek	1	18		2	1	3	3.0
3512	Almota Creek	1	20		1	1	3	4.0
3513	Alpowa Creek	1	21		3	2	2	3.0
3514	Penewawa Creek	1	16		0	1	3	4.0
3515	Deadman Creek	1	24		3	1	2	4.0
3516	North Deadman Creek	1	32		3	2	3	4.0
3517	Deadman Gulch	1	28		3	1	3	4.0
3518	Tenmile Creek	2	15		0	2	3	3.0
3519	Mill Creek	1	24		2	1	3	4.0
3520	Couse Creek	2	12		0	1	2	4.0
3521	Tumalum Creek	1	16		0	1	3	4.0
3522	Grande Ronde River	3	3		1	2	2	0.5
3523	Buford Creek	2	12				3	4.0
3524	Menatchee Creek	3	9				3	3.0
3525	Joseph Creek	3	3		1	2	2	0.5
3526	Cottonwood Creek	3	2		1	1	2	0.5
3527	Cougar Creek	3	7		2	3	2	1.0
3528	Rattlesnake Creek	3	7		2	3	2	1.0
3529	West Branch Rattlesnake Ck	3	6		1	3	2	1.0

6. Maps

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Figure C-1 Assessed Stream Reaches

DEPARTMENT OF ECOLOGY State of Washington

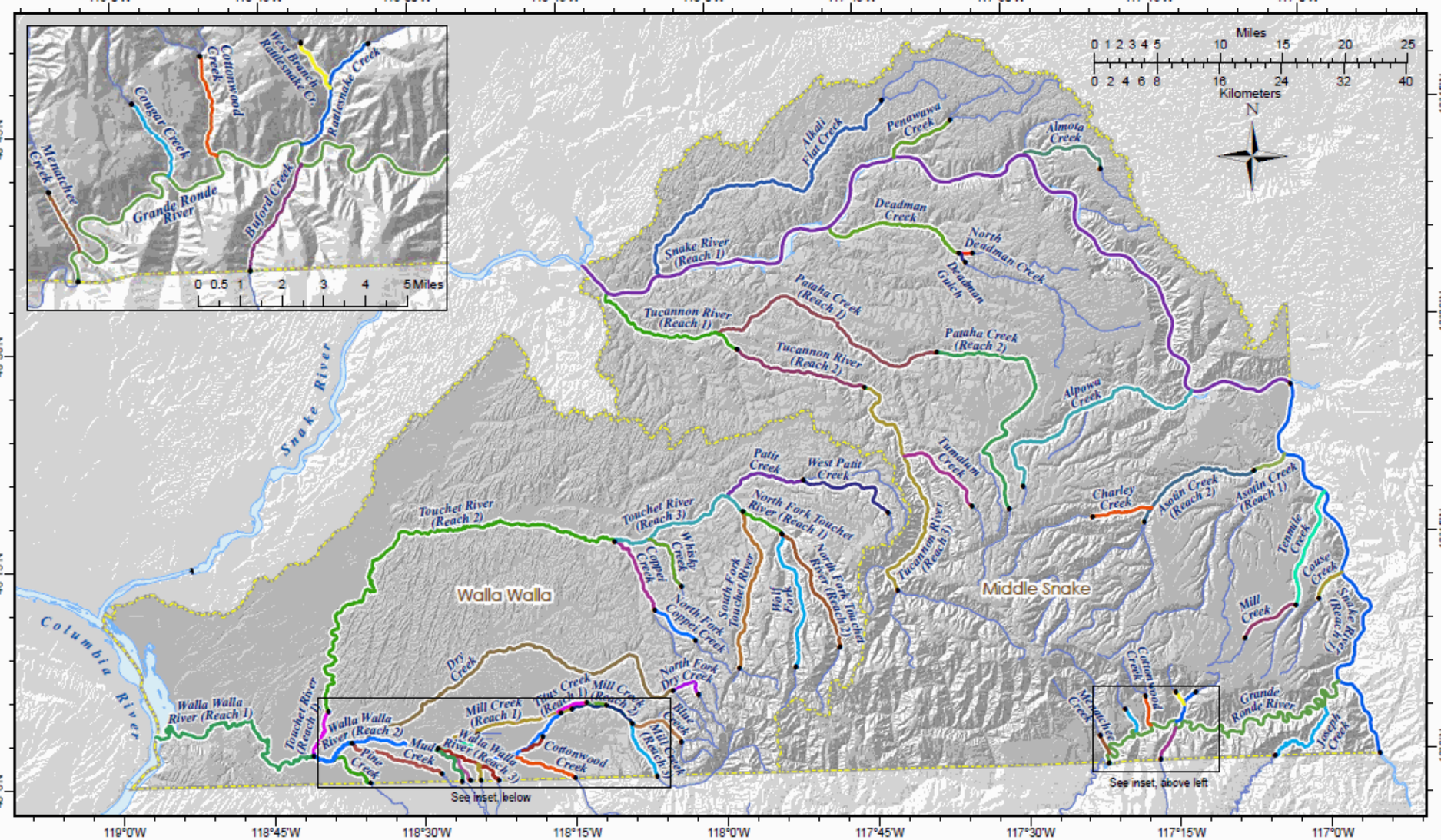
Washington Department of FISH and WILDLIFE

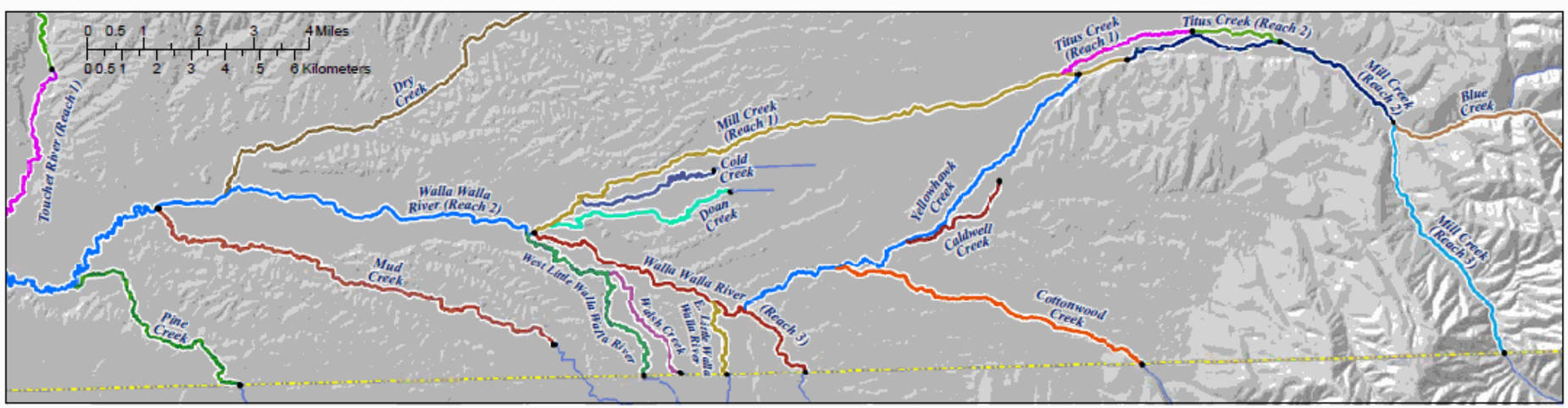
Walla Walla and Middle Snake River Basins

WRIAs 32 and 35
Assessed Stream Reaches colored for visual reference

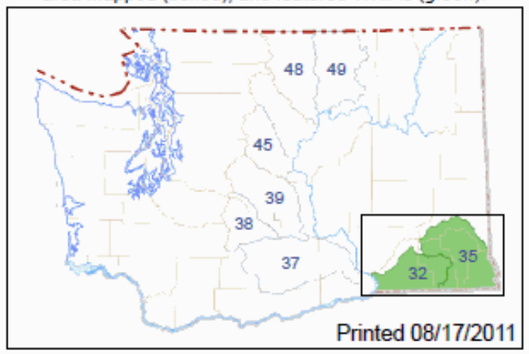
• — Assessed Stream Reach upper extents

Continuation of Assessed Streams to Headwaters





Location of all project WRIAs (blue), location of the area mapped (boxed), and featured WRIAs (green).



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WRIAs 32 and 35 - Walla Walla and Middle Snake River Basins - Priority Streams

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Figure C-2 Combined Prioritization Scores Fish, Habitat, & Flow

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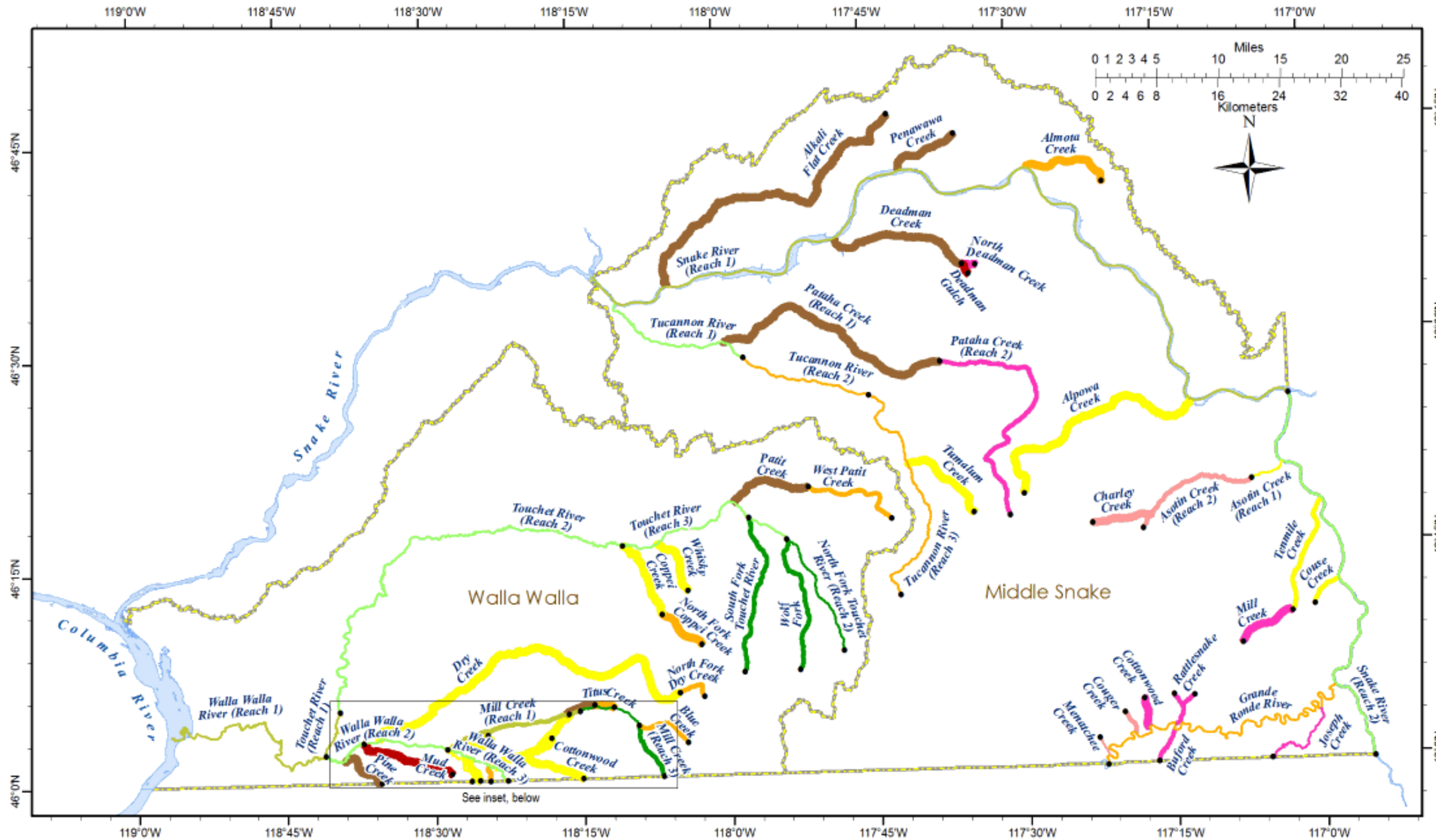
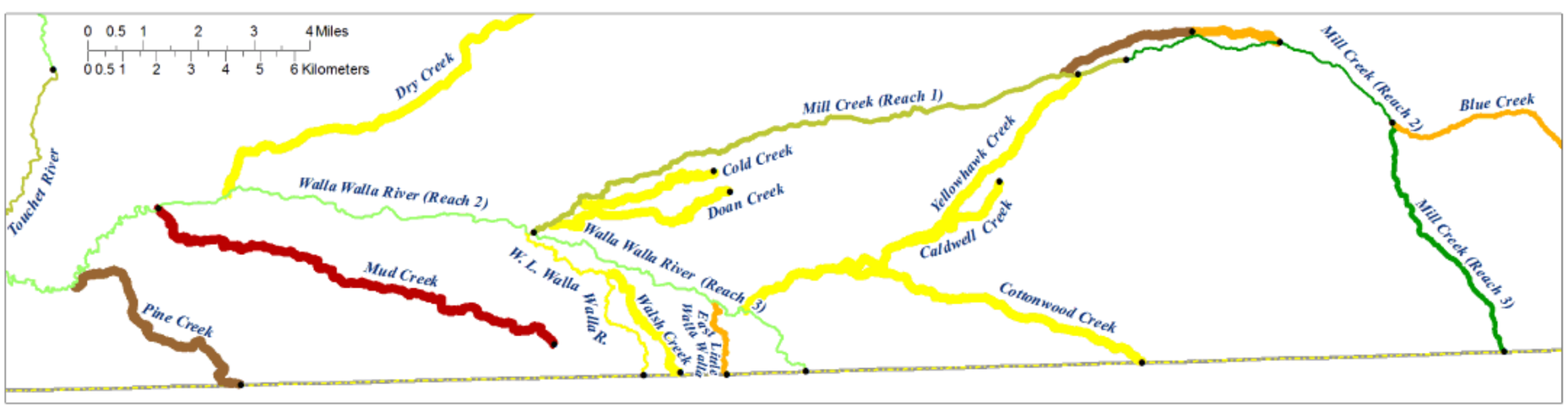
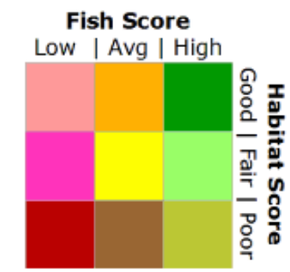
Washington Department of FISH and WILDLIFE

Walla Walla and Middle Snake River Basins
WRIAs 32 and 35
Combined Prioritization Scores for Fish, Habitat, and Flow





Fish Status/Utilization and Habitat Condition scores use this color scheme:



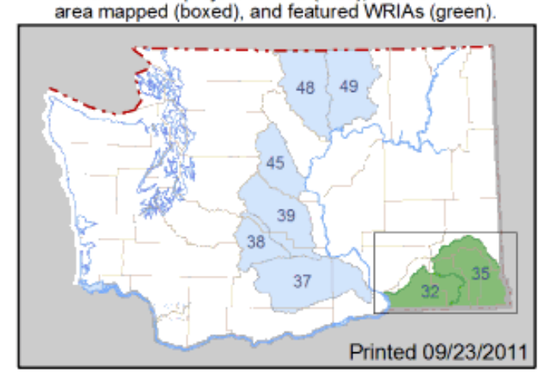
Flow Condition score uses line thickness

- Good
- Fair
- Poor

• — Assessed Stream Reach upper extents

WRIA Boundary

Location of all project WRIAs (blue), location of the area mapped (boxed), and featured WRIAs (green).



WRIAs 32 and 35 - Walla Walla and Middle Snake River Basins - Fish, Habitat, and Flow

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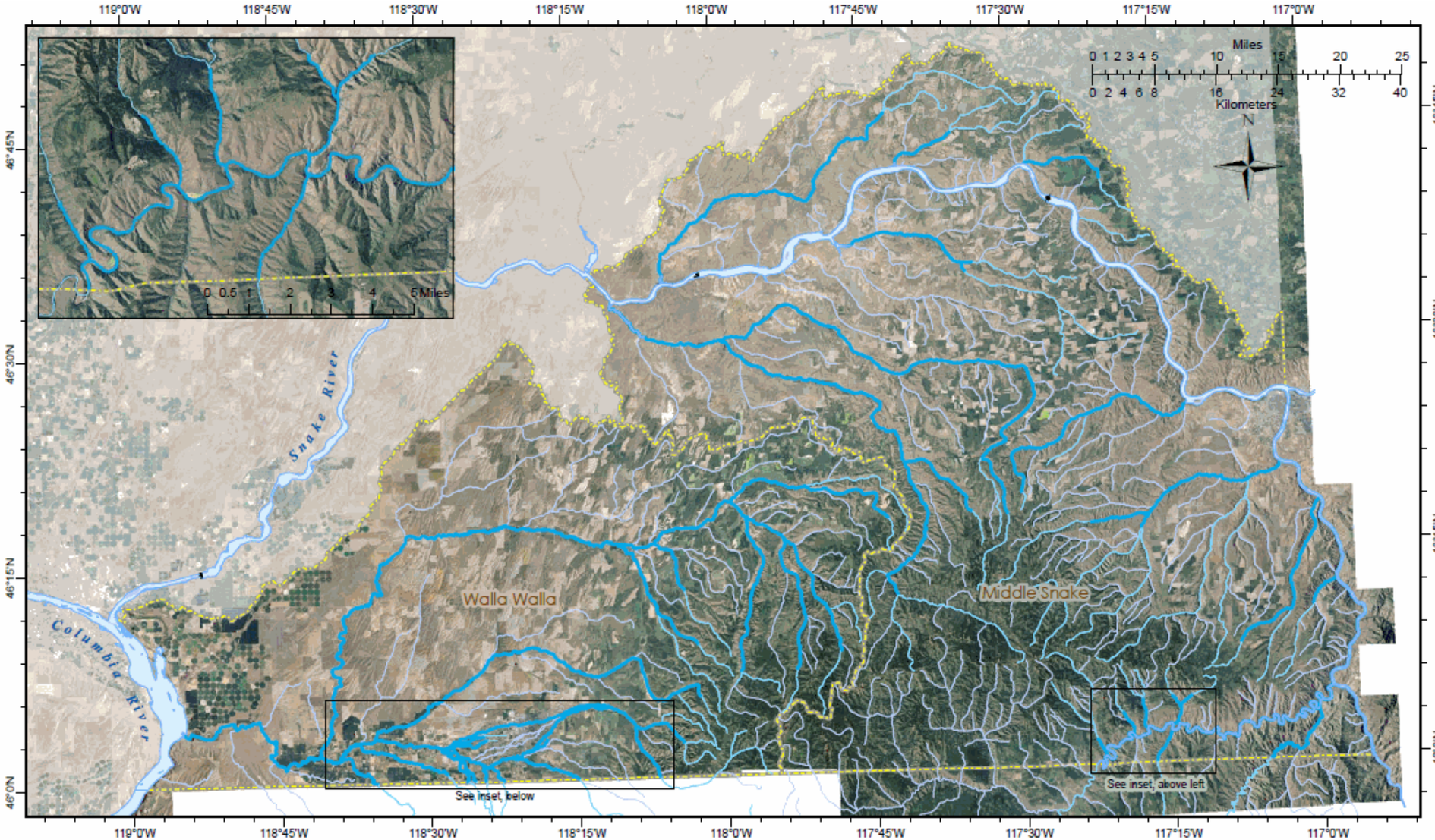
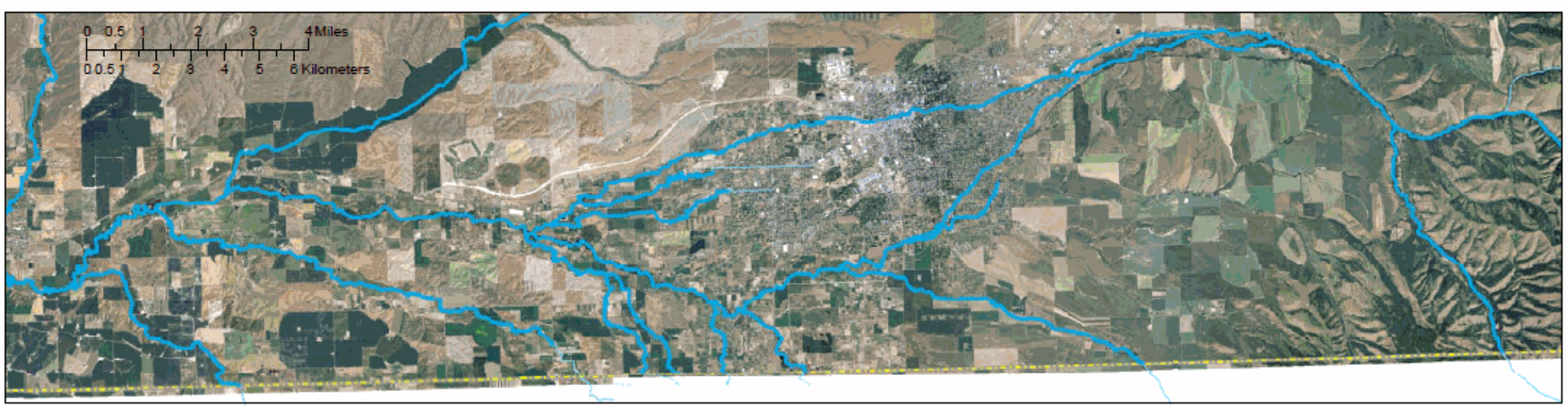
Figure C-3 2001 Statewide 1m Orthophoto





DEPARTMENT OF ECOLOGY State of Washington

Washington Department of FISH and WILDLIFE

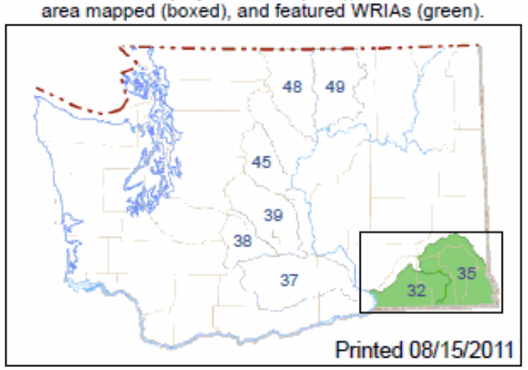
Walla Walla and Middle Snake River Basins

WRIAs 32 and 35
2009 Statewide 1m Orthophoto

Stream Distinctions

- Assessed Reaches
- Headwaters of Assessed Reaches
- Other Named Streams
- **WRIA Boundary**

Location of all project WRIAs (blue), location of the area mapped (boxed), and featured WRIAs (green).



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WRIAs 32 and 35 - Walla Walla and Middle Snake River Basins - Orthophoto

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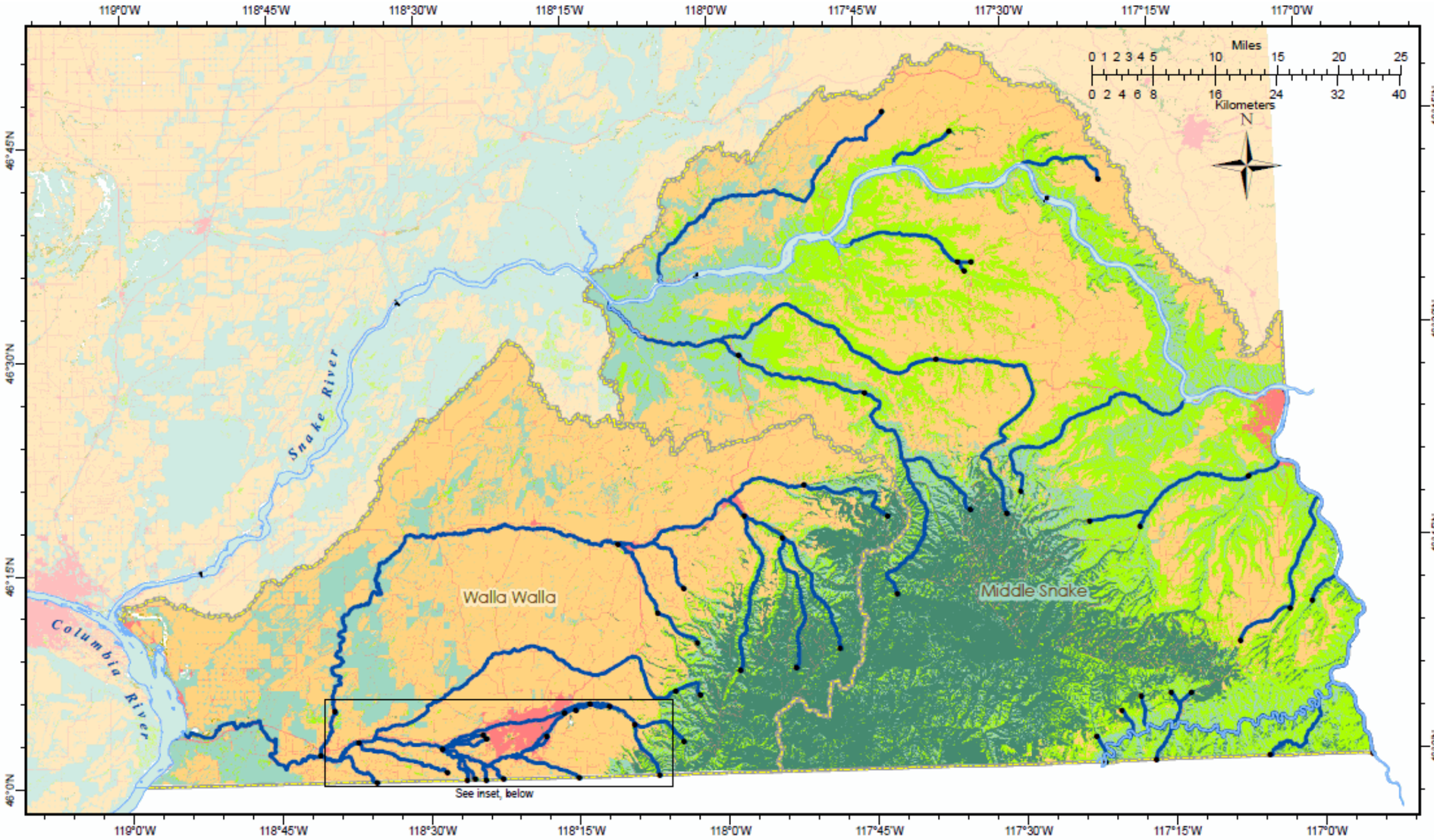
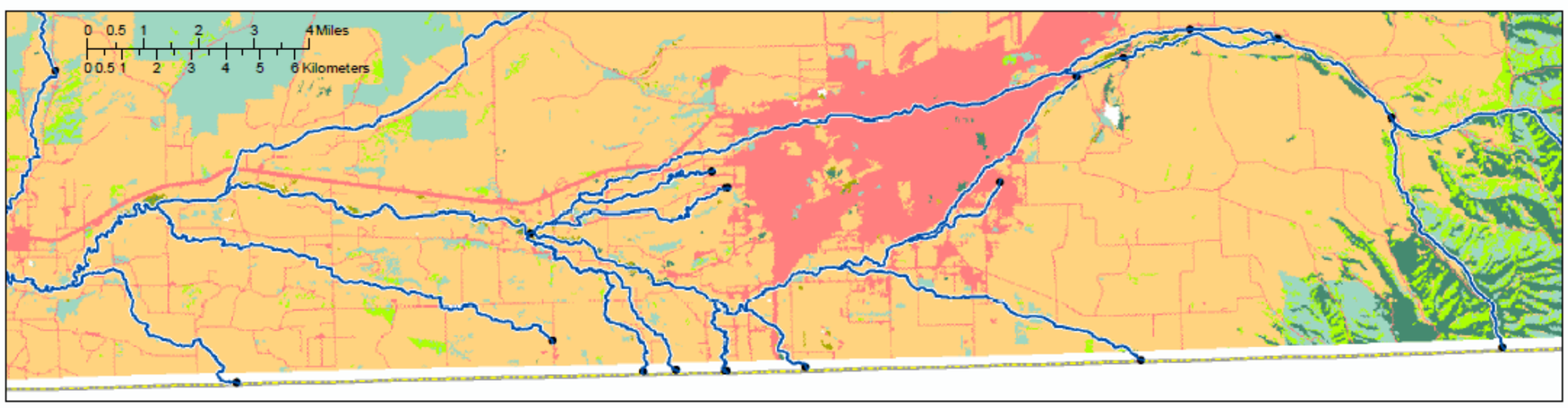
Figure C-4 2001 National Land Cover Database





DEPARTMENT OF ECOLOGY State of Washington

Washington Department of FISH and WILDLIFE

Walla Walla and Middle Snake River Basins

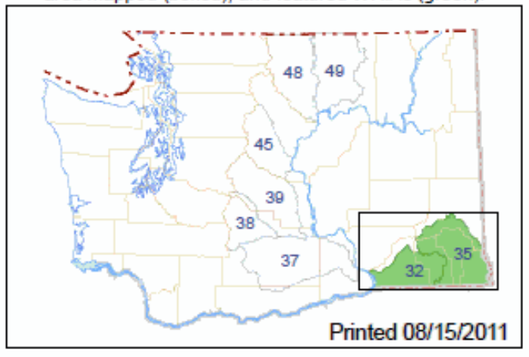
WRIAs 32 and 35
2001 National Land Cover Database

Land Cover and Use

- Snow and Ice
- Developed
- Barren
- Forest
- Scrub
- Grasslands
- Agriculture
- Riparian

Assessed Stream Reaches with upper extents marked

Location of all project WRIAs (blue), location of the area mapped (boxed), and featured WRIAs (green).



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WRIAs 32 and 35 - Walla Walla and Middle Snake River Basins - NLCD

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Figure C-5 Stream Gauge Identification and Land Management

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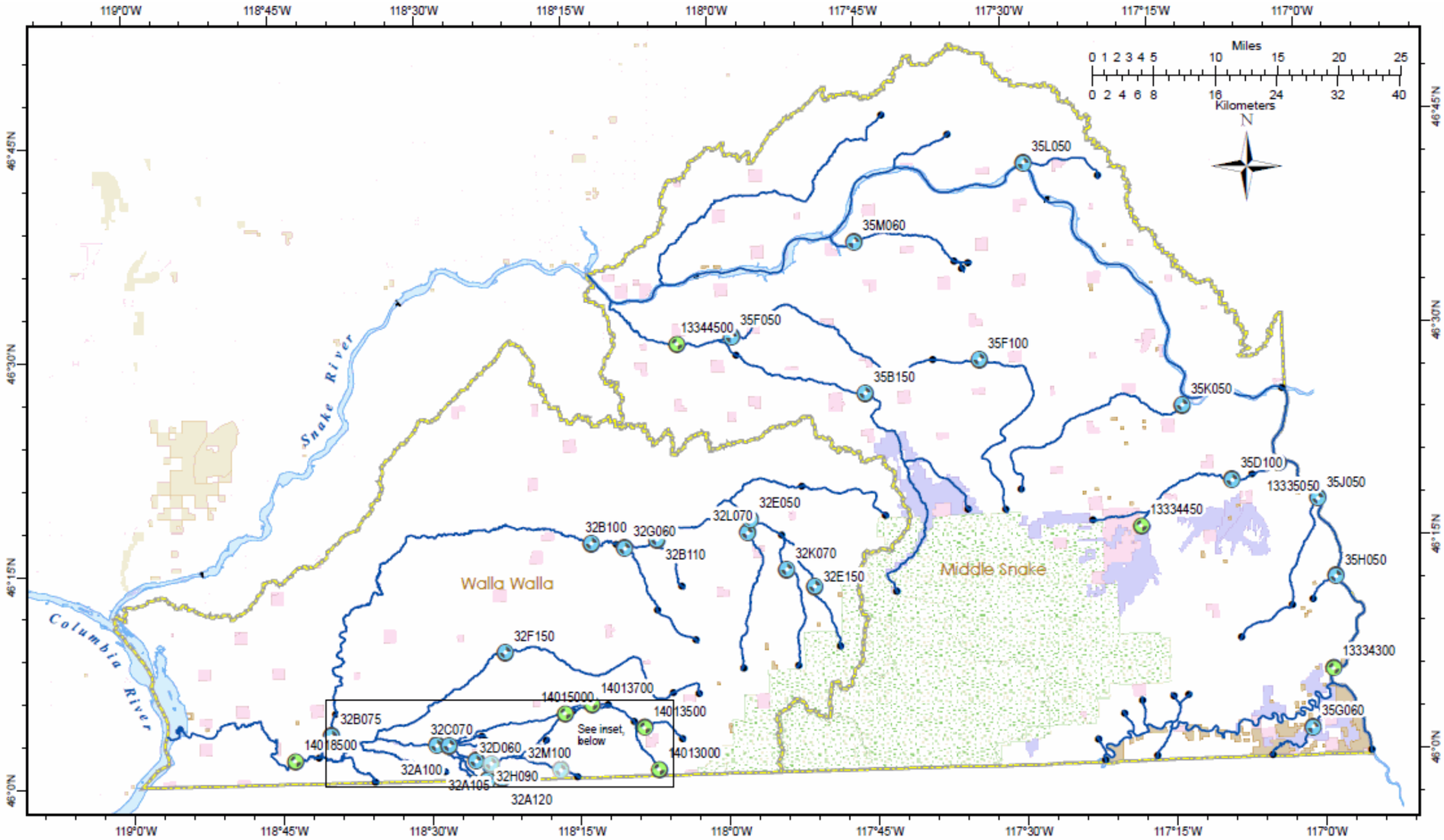
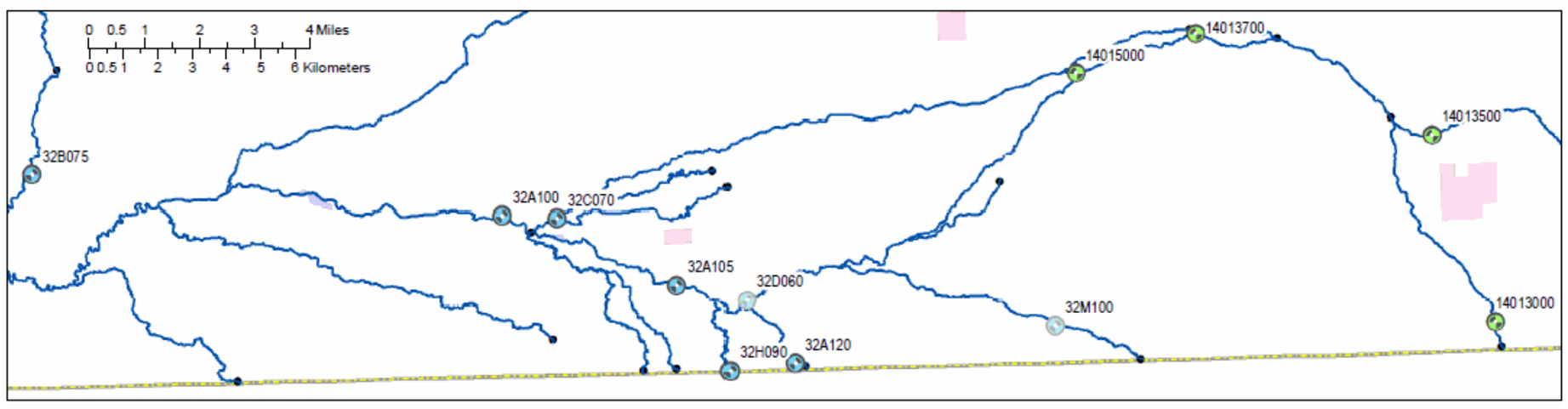
Washington Department of FISH and WILDLIFE

Walla Walla and Middle Snake River Basins

WRIAs 32 and 35
Stream Gauge Identification and Land Management





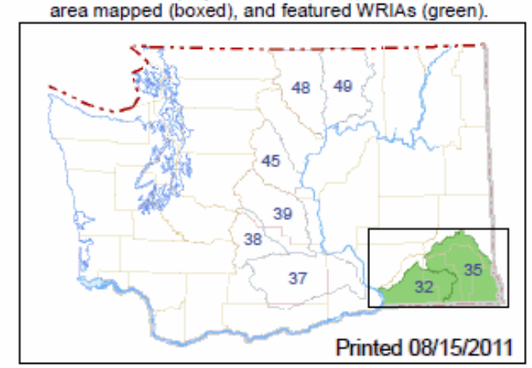
Stream Gauges by Agency
- WA DOE
- WA DOE (limited data)
- USBR
- USGS
- USGS (limited data)

Generalized Land Management
- Tribal
- US Bureau of Land Mgmt.
- US Bureau of Reclamation
- US Forest Service
- WA Dept. Fish & Wildlife
- WA Dept. Natural Resources

Assessed Stream Reaches with upper extents marked

WRIA Boundary

Location of all project WRIAs (blue), location of the area mapped (boxed), and featured WRIAs (green).



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WRIAs 32 and 35 - Walla Walla and Middle Snake River Basins - Gauges, Lands