

# Columbia River Instream Atlas Project

Washington Department of Fish and Wildlife

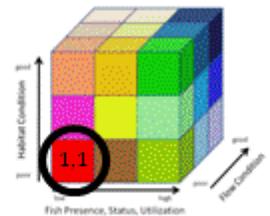
Final Report – APPENDIX D

WRIAs 37, 38, 39 YAKIMA BASIN

3910 Parke Creek

Fish	Habitat	Flow
1	1	1

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



Flow Condition score uses line thickness

∩ Good

∩ Fair

∩ Poor

1



Washington  
Department of  
**FISH and  
WILDLIFE**



# **Columbia River Instream Atlas Project - Final Report**

## **Appendix D – WRIAs 37, 38, 39 Yakima Basin**

September 30, 2011

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# Columbia River Instream Atlas Project

## Final Report

### Appendix D – WRIAs 37, 38, 39 - Yakima Basin

September 30, 2011

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## 1. Description<sup>1</sup>

The Yakima River basin is located in south central Washington and contains a diverse landscape of rivers, ridges, and mountains totaling just over 6,100 square miles. Within the basin are three WRIAs; Lower Yakima River (WRIA 37), Naches River (WRIA 38), and Upper Yakima River (WRIA 39). Along the western portion of the basin, the glaciated peaks and deep valleys of the Cascade Mountains exceed 8,000 feet. East and south from the Cascade crest, the elevation decreases to the broad valleys and the lowlands of the Columbia Plateau. The lowest elevation in the basin is 340 feet at the confluence of the Yakima and Columbia Rivers at Richland. Total runoff from the

1 Adapted from Northwest Power and Conservation Council 2005h, and Yakima River Basin Proposed Integrated Water Resource Management Plan, 2011.

basin averages approximately 3.4 million acre-feet per year, ranging from a low of 1.5 to a high of 5.6 million acre-feet.

The basin contains a variety of aquatic habitats; the large mainstem of the Yakima River; medium-size rivers such as the upper Yakima, Cle Elum, and Naches; and many smaller tributaries, such as the Little Naches River, Satus, Ahtanum, and Taneum creeks, and the headwaters above the basin's reservoirs. The construction and operation of the irrigation reservoirs significantly altered the natural seasonal hydrograph of all downstream reaches of the mainstem and some tributaries.

The basin is dominated by the U.S. Bureau of Reclamation Yakima Project. The Yakima Project is a federal reclamation project authorized in 1905. It is operated by Reclamation and provides irrigation water for fertile land that extends for 175 miles along both sides of the Yakima River in south-central Washington. The irrigable lands presently being served by Reclamation total approximately 464,000 acres, with an additional 45,000 acres irrigated by private interests under water supply contracts with Reclamation. Storage dams and reservoirs on the project are Bumping Lake, Clear Lake, Tieton, Cle Elum, Kachess, and Keechelus. Total storage capacity of all reservoirs is approximately 1.07 million acre feet, total diversions average over 2.5 million acre feet.

The Yakima River historically supported large runs of anadromous salmonids, with estimated runs of 300,000 to 960,000 fish a year in the 1880s. These numbers have declined drastically, and three salmon species were extirpated (eliminated) from the basin - sockeye, summer Chinook, and coho. While still well below historic levels, in more recent years anadromous fish populations have improved through a combination of fisheries management, habitat, facility improvements, hatchery supplementation, and reintroduction efforts. Habitat conditions are improving for steelhead. Reintroduction efforts by the Yakama Indian Nation (YIN) using hatchery fish have re-established naturally reproducing coho salmon, and YIN and Washington Department of Fish and Wildlife (WDFW) have begun reintroduction of sockeye and summer Chinook salmon.

Historic bull trout abundance is not well defined in the basin, but there is recognition that its historic distribution was broader than is presently observed, with many distinct populations. The basin was recently designated as critical bull trout habitat, and there is a need to reinstitute year-round connectivity of bull trout habitat between lakes and reservoirs and mainstem rivers, including the Columbia River.

The Yakima River Basin is affected by a variety of water problems that impact fish, agriculture, and municipal and domestic water supplies. Since at least the 1970s, the basin's federal, state and local agencies, and YIN natural resource managers have participated in federal and state planning efforts to identify solutions to water shortages and restore native fisheries. Building on previous planning efforts, the Yakima River Basin Water Enhancement Plan Workgroup developed a 2011 proposed Yakima Basin Integrated Water Resource Management Plan (Integrated Plan), which is the most comprehensive effort to-date in proposing water resource and habitat protection and restoration solutions in the Yakima Basin.

Elements of Integrated Plan goals and objectives are incorporated throughout this report, but the priorities and analysis methods differ from this Columbia River Instream Atlas. Integrated Plan evaluations considered first the system as a whole, and then a reach's role within the system. Planners evaluated how a reach should operate in order to optimize system objectives for out-of-stream and instream needs. An Instream Needs subcommittee identified gaps between present and future desired conditions, and prioritized specific actions in order to achieve instream needs.

This prioritization method differs from, and is much more sophisticated than the methods used for the Columbia River Instream Atlas. Also, prioritization in the Integrated Plan is limited to major stream reaches. The Atlas' strength and usefulness in the Yakima Basin is its singular focus on water supply development (i.e. stream flow enhancement), and its evaluation of smaller streams and stream reaches.

CRIA is a great starting place for the layperson, or people unfamiliar with Reclamation water management in the Yakima Basin. Users can learn basic information about salmonid species utilization, get a feel for salmonid habitat condition, and start to understand flow condition in the basin. Deeper understanding of water management and salmon habitat conditions can be achieved by moving on to material available from Bureau of Reclamation at <http://www.usbr.gov/pn/programs/yrbwep/index.html> and Department of Ecology Office of Columbia River at [http://www.ecy.wa.gov/programs/wr/cwp/cr\\_yak\\_storage.html](http://www.ecy.wa.gov/programs/wr/cwp/cr_yak_storage.html).

## 2. Reach Definitions

The Yakima Basin comprises three WRIs: Lower Yakima River (WRIA 37), Naches River (WRIA 38), and Upper Yakima River (WRIA 39). Within each WRIA, major rivers and large streams are divided into reaches that start and stop at dams or major tributaries. Most of the larger river reaches coincide with state and federal jurisdictional management units that are specific to water management, fish stock management, or WRIA boundaries. CRIA reaches were aligned with YRBWEP reaches to ensure consistency.

These designated reaches represent the most contemporary breakout of mainstem channel reaches based on hydrologic function. Streams that drain into or are above reservoirs are not delineated as there are very few non-exempt water rights large enough to provide significant flow supplementation. In some cases reaches begin or terminate at a flow gauge location, making it easier to account for flow supplementation.

The lower Yakima River (WRIA 37) smaller streams are designated based on differences in fish stock utilization and instream habitat conditions when compared to mainstem reaches. Within WRIA 37 flow is a limiting factor for salmonid production in all of the smaller streams.

In the Naches (WRIA 38) the smaller stream reach boundaries start where there is a significant change in flow value, such as a confluence with another stream and stop at

a point where there are no further diversions upstream. The Tieton and Bumping Rivers start at a major confluence and terminate at the first dam upstream. Instream habitat and flow values change very little within a major river reach boundary.

The mainstem Yakima River reaches in the Upper Yakima Basin (WRIA 39) all start at either a major confluence or a dam and end at a comparable situation upstream. Other than the Teanaway River, the remaining streams are denoted as a single reach. Most of the smaller stream reaches start at their mouth and terminate where the streams crosses a highline irrigation canal or at a point where no further points of diversion exist on the stream. Most of the smaller WRIA 39 tributaries flow out of National Forest lands where there are very few water rights; hence the federal ownership boundary forms the upper extent of those reaches. Exceptions include the Teanaway River and the First Creek drainage. These respective reaches start where there is a significant change in flow value (stream confluence) and terminate at the most upstream irrigation diversion.

**Table D-1 Reach Definitions**

Stream Name	Reach Code	Stream Reach Description
Lower Yakima (WRIA 37)		
Lower Yakima River (Reach 1)	3701	Mouth to Chandler Canal Return
Lower Yakima River (Reach 2)	3702	Chandler return to Prosser Dam
Lower Yakima River (Reach 3)	3703	Prosser Dam to Toppenish Creek
Lower Yakima River (Reach 4)	3704	Toppenish Creek to Parker (Sunnyside) Dam
Lower Yakima River (Reach 5)	3705	Parker (Sunnyside) Dam to Naches River
Satus Creek	3706	Mouth to Logy Creek
Toppenish Creek	3707	Mouth to Simcoe Creek
Simcoe Creek	3708	Mouth to Wahtum Creek
Ahtanum Creek	3709	Mouth to Ahtanum Creek forks
North Fork Ahtanum Creek	3710	Mouth to Nasty Creek
Wide Hollow Creek	3711	Mouth to Dazet Road, Harwood
Naches River (WRIA 38)		
Naches River (Reach 1)	3801	Mouth to Tieton River
Naches River (Reach 2)	3802	Tieton River to Bumping River
Cowiche Creek	3803	Mouth to Cowiche Creek forks
South Fork Cowiche Creek	3804	Mouth to Reynolds Creek
Tieton River	3805	Mouth to Tieton Dam
Rattlesnake Creek	3806	Mouth to McDaniel Diversion at 120°57'15.3"W 46°48'47.1"N
Gold Creek	3807	Mouth to first left bank tributary
Little Naches River	3808	Mouth to North Fork Little Naches River
Bumping River	3809	Mouth to Bumping Dam

Stream Name	Reach Code	Stream Reach Description
Upper Yakima (WRIA 39)		
Upper Yakima River (Reach 1)	3901	Naches River to Roza Dam
Upper Yakima River (Reach 2)	3902	Roza Dam to Teanaway River
Upper Yakima River (Reach 3)	3903	Teanaway to Cle Elum River
Upper Yakima River (Reach 4)	3904	Cle Elum River to Easton Dam
Upper Yakima River (Reach 5)	3905	Easton Dam to Keechelus Dam
Wenas Creek	3906	Mouth to Wenas Dam
Burbank Creek	3907	Mouth to GIS RM 1.9
Wilson Creek	3908	Mouth to upper confluence with Naneum Creek
Cherry Creek	3909	Mouth to Parke Creek / Cooke Creek confluence
Parke Creek	3910	Mouth to Mundy Road, near East Kittitas
Cooke Creek	3911	Mouth to KRD North Branch Canal
Caribou Creek	3912	Mouth to KRD North Branch Canal
Naneum Creek	3913	Mouth to USGS gauge 12483800 near Naneum Road
Coleman Creek	3914	Mouth to KRD North Branch Canal
Schnebly Creek	3915	Mouth to KRD North Branch Canal
Mercer Creek	3916	Mouth to KRD North Branch Canal
Reecer Creek	3917	Mouth to KRD North Branch Canal
Whiskey Creek	3918	Mouth to Wilson Creek
Currier Creek	3919	Mouth to KRD North Branch Canal
Manastash Creek	3920	Mouth to Manastash Creek forks
Dry Creek	3921	Mouth to KRD North Branch Canal
Taneum Creek	3922	Mouth to Knudson Diversion
Swauk Creek	3923	Mouth to Williams Creek.
First Creek	3924	Mouth to First Creek Water User Diversion
Williams Creek	3925	Mouth to the road crossing 2.4 miles above Liberty
Teanaway River	3926	Mouth to Teanaway River forks
North Fork Teanaway River	3927	Mouth to Jack Creek
Cle Elum River	3928	Mouth to Cle Elum Dam
Big Creek	3929	Mouth to removed dam site
Little Creek	3930	Mouth to KRD Main Canal

### 3. WRIA Results

#### *Fish Status and Utilization*

Components of the Fish status and 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.

Twelve salmonid stocks frequent this basin complex. There are three stocks of spring Chinook: American River; Upper Yakima River; and Naches and two fall Chinook stocks: Yakima River Bright and Marion Drain. In contrast there are four stocks of summer steelhead: Naches; Satus Creek; Toppenish Creek; and Upper Yakima. Other stocks include bull trout, coho, and sockeye.

Of these twelve stocks, steelhead and bull trout are listed as threatened under ESA and unknown for SaSI. In contrast, stocks of spring Chinook and fall Chinook do not warrant a rating by ESA and are considered healthy under SaSI. Even though Marian Drain Fall Chinook is a self-sustaining population that occurs in a 19-mile irrigation ditch for the Wapato Irrigation Project, SaSI recognizes Marion Drain Fall Chinook as a distinct stock. Coho, sockeye, and summer Chinook have been reintroduced to the basin complex, therefore not recognized by ESA or SaSI. As such coho, sockeye, and summer Chinook status is rated as unknown for this project

Sockeye, coho, and summer Chinook were all extirpated from the Yakima Basin Complex. Endemic coho salmon were extirpated in the early 1980's, whereas endemic anadromous sockeye were extirpated from the Yakima River Basin after access to their spawning grounds was severed by dams at Kachess, Cle Elum, Keechelus and Bumping rivers. Summer Chinook spawned in the gap to gap reach near Yakima up until the early 1970's. Since 2009, progeny of reintroduced sockeye have been returning to these same areas, and are being trucked around the dam to spawn. The coho that presently spawn in the Yakima Basin are returns from both hatchery supplementation fish (smolt and parr releases) and from stocked coho that are reproducing in the basin complex streams. The YIN Fish Management Program started to release summer Chinook sub yearlings in 2009.

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

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

SaSI Stock name	SaSI Status	ESA Unit Name	ESA Listing Status
<b>Lower Yakima (WRIA 37)</b>			
Yakima River Bright Fall Chinook	Healthy	Upper Columbia River Summer and Fall Run Chinook	Not Warranted
Marion Drain Fall Chinook	Healthy	No ESU Specified	Not Warranted
Upper Yakima River Spring Chinook	Depressed	Mid-Columbia River Spring Run Chinook	Not Warranted
Naches Spring Chinook	Depressed		
American River Spring Chinook	Depressed		
Satus Creek Summer Steelhead	Unknown	Middle Columbia Steelhead	Threatened
Toppenish Creek Summer Steelhead	Unknown		
Naches Summer Steelhead	Unknown		
Upper Yakima Summer Steelhead	Unknown		
Yakima River Bull Trout	Critical	Middle Columbia River Bull Trout	Threatened
Ahtanum Creek Bull Trout	Critical		
Sockeye - SaSI stock not assigned	Unknown	n/a	n/a
Coho - SaSI stock not assigned	Unknown	n/a	n/a
<b>Naches River (WRIA 38)</b>			
Naches Spring Chinook	Depressed	Mid-Columbia River Spring Run Chinook	Not Warranted
American River Spring Chinook	Depressed		
Naches Summer Steelhead	Unknown	Middle Columbia Steelhead	Threatened
South Fork Tieton Bull Trout	Healthy	Middle Columbia River Bull Trout	Threatened
Indian Creek Bull Trout	Depressed		
North Fork Tieton River Bull Trout	Unknown		
Rattlesnake Creek Bull Trout	Depressed		
American River Bull Trout	Depressed		
Crow Creek Bull Trout	Critical		
Deep Creek Bull Trout	Depressed		
Coho - SaSI stock not assigned	Unknown	n/a	n/a
<b>Upper Yakima (WRIA 39)</b>			
Upper Yakima River Spring Chinook	Depressed	Mid-Columbia River Spring Run Chinook	Not Warranted
Upper Yakima Summer Steelhead	Unknown	Middle Columbia Steelhead	Threatened
North Fork Teanaway River Bull Trout	Critical	Middle Columbia River Bull Trout	Threatened
Cle Elum/Waptus Lakes Bull Trout	Unknown		
Box Canyon Creek Bull Trout	Critical		
Kachess River Bull Trout	Critical		
Gold Creek (Yakima) Bull Trout	Critical		
Sockeye - SaSI stock not assigned	Unknown	n/a	n/a
Coho - SaSI stock not assigned	Unknown	n/a	n/a

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

Fish Species - SaSI Stock (SaSI)	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yakima Fall Chinook (ESA Not Warranted; 2 Healthy SaSI Stocks)	Adult In-Migration												
	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												
	Juvenile Out-Migration												
Yakima Spring Chinook (ESA Not Warranted; 3 Depressed SaSI Stocks)	Adult In-Migration												
	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												
	Juvenile Out-Migration												
Yakima Summer Steelhead (ESA Threatened; 4 Unknown SaSI Stocks)	Adult In-Migration												
	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												
	Juvenile Out-Migration												
Yakima Sockeye (No ESA stock; No SaSI Stock)	Adult In-Migration												
	Juvenile Out-Migration												
Yakima Coho (No ESA stock; 1 Unknown SaSI Stock)	Adult In-Migration												
	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												
	Juvenile Out-Migration												
Yakima Bull Trout (ESA Threatened; 14 Depressed SaSI Stocks)	Spawning												
	Egg Incubation & Fry Emergence												
	Rearing												

**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 D-4 Fish status/utilization score & bin by stream reach**

Reach Code	Reach Name	Prioritization Score	Normalized Score	Bin
Lower Yakima (WRIA 37)				
3701	Lower Yakima River (Reach 1)	422	0.96	3
3702	Lower Yakima River (Reach 2)	422	0.96	3
3703	Lower Yakima River (Reach 3)	422	0.96	3
3704	Lower Yakima River (Reach 4)	438	1.00	3
3705	Lower Yakima River (Reach 5)	382	0.87	3
3706	Satus Creek	321	0.75	3
3707	Toppenish Creek	296	0.68	3
3708	Simcoe Creek	131	0.30	1
3709	Ahtanum Creek	316	0.72	3
3710	North Fork Ahtanum Creek	203	0.46	2
3711	Wide Hollow Creek	244	0.56	2
Naches River (WRIA 38)				
3801	Naches River (Reach 1)	343	0.78	3
3802	Naches River (Reach 2)	275	0.63	2
3803	Cowiche Creek	220	0.50	2
3804	South Fork Cowiche Creek	131	0.30	1
3805	Tieton River	241	0.55	2
3806	Rattlesnake Creek	259	0.59	2
3807	Gold Creek	233	0.53	2
3808	Little Naches River	259	0.59	2
3809	Bumping River	280	0.62	2
Upper Yakima (WRIA 39)				
3901	Upper Yakima River (Reach 1)	303	0.69	3
3902	Upper Yakima River (Reach 2)	221	0.50	2
3903	Upper Yakima River (Reach 3)	221	0.50	2
3904	Upper Yakima River (Reach 4)	221	0.50	2
3905	Upper Yakima River (Reach 5)	221	0.50	2
3906	Wenas Creek	84	0.19	1
3907	Burbank Creek	84	0.19	1
3908	Wilson Creek	110	0.25	1
3909	Cherry Creek	110	0.25	1
3910	Parke Creek	110	0.25	1
3911	Cooke Creek	110	0.25	1

Reach Code	Reach Name	Prioritization Score	Normalized Score	Bin
3912	Caribou Creek	110	0.25	1
3913	Naneum Creek	110	0.25	1
3914	Coleman Creek	110	0.25	1
3915	Schnebly Creek	110	0.25	1
3916	Mercer Creek	110	0.25	1
3917	Reecer Creek	110	0.25	1
3918	Whiskey Creek	110	0.25	1
3919	Currier Creek	110	0.25	1
3920	Manastash Creek	169	0.39	2
3921	Dry Creek	110	0.25	1
3922	Taneum Creek	169	0.39	2
3923	Swauk Creek	179	0.41	2
3924	First Creek	69	0.16	1
3925	Williams Creek	93	0.21	1
3926	Teanaway River	241	0.55	2
3927	North Fork Teanaway River	241	0.55	2
3928	Cle Elum River	221	0.50	2
3929	Big Creek	143	0.33	1
3930	Little Creek	143	0.33	1

### ***Habitat Condition***<sup>2</sup>

The Yakima River drains an area of 15,900 square km (6,155 square miles) and contains about 3058 km (1,900 river miles) of perennial streams. Originating near the crest of the Cascade Range above Keechelus Lake, the Yakima River flows 344 km (214 miles) southeastward to its confluence with the Columbia River at RM 335.2. Major tributaries include the Kachess, Cle Elum and Teanaway rivers in the northern part of the subbasin, and the Naches River in the west. The Naches has four major tributaries, the Bumping, American, Tieton and Little Naches rivers. Ahtanum, Toppenish and Satus creeks join the Yakima in the lower subbasin. Six major reservoirs are located in the subbasin and form the storage component of the federal Yakima Project, managed by the Bureau of Reclamation. The Yakima River flows out of Keechelus Lake (157,800 acre feet), the Kachess River from Kachess Lake (239,000 acre feet), the Cle Elum River from Cle Elum Lake (436,900 acre feet), the Tieton from Rimrock Lake (198,000 acre feet), and the Bumping from Bumping Lake (33,700 acre feet). The North Fork of the Tieton River connects Clear Lake (5,300 acre feet)

<sup>2</sup> Adapted from *Habitat Limiting Factors: Yakima River Watershed. Water Resources Inventory Area 37-39 Final Report*, D. Haring, 2001

with Rimrock Lake. All reservoirs except Rimrock and Clear Lake were natural lakes before impoundment.

Vegetation in the subbasin is a complex blend of forest, range (grass lands and shrub steppe) and cropland. Over one-third of the land in the Yakima Subbasin is forested. Rangeland lies between cultivated areas, located in the fertile lower valleys, and the higher-elevation forests. Almost all shrub-steppe habitats in the subbasin are supported by highly fragile soils that are easily eroded. Riparian conditions are extremely varied, ranging from severely degraded to nearly pristine. Good riparian habitat generally is found along forested, headwater reaches, whereas degraded riparian habitat is concentrated in the valleys, frequently associated with agricultural and residential activity (especially streamside grazing, tillage, or mowing).

The predominant types of land use in the Yakima Subbasin include irrigated agriculture (1,000 square miles), urbanization (50 square miles), timber harvest (2,200 square miles) and grazing (2,900 square miles). Cropland accounts for about 16% of the total subbasin area of which 77% is irrigated. About two-thirds of the floodplain gravel mining in Washington State occurred along the Yakima River or the lower reaches of two of its tributaries, the Cle Elum and Naches Rivers. The Selah Pit and surrounding pits comprise the largest pit complex in the state, at more than 230 acres in 1986.

Five distinct channel provinces are very apparent along the altitudinal gradient from source to mouth; 1) high gradient, largely constrained headwaters, 2) braided alluvial flood plains, 3) constrained canyons, 4) meandering with expansive flood plains containing oxbows, and 5) delta flood plain at the confluence with the Columbia River.

The Columbia River basalts, located within the Columbia Plateau, represent a locally important aquifer system. The overlying alluvial aquifers are highly permeable and are heterogeneous and anisotropic, due to their deposition within the fluvial environment. The rocks of the Cascade Mountain province store and transmit little water via aquifer system while the majority of runoff occurs as overland flow.

Scientists characterized the historical hydrologic cycle in the Yakima Basin as an extensive exchange between the surface, hyporheic, and groundwater zones. This exchange occurred mainly in the vast alluvial valleys and flood plains, which functioned as hydrologic buffers, distributing the energy of peak flows and moving cool, spring melt water out onto the flood plains. This annual recharge of the shallow, near surface aquifers often occurred well into summer due to extensive and long-lasting snow pack in the Cascades. Groundwater recharge of this nature provides a source of groundwater that maintains base flow and a cool thermal refuge as summer progresses and air temperatures increase, as well as maintaining warmer winter temperatures that prevent or reduce the risk of anchor ice.

Reaches associated with alluvial flood plains are centers of biological productivity and ecological diversity in gravel-bed rivers. In the Yakima basin, bedrock constrictions between alluvial subbasins control the exchange of water between streams and the aquifer system. Under pre-development conditions, vast alluvial flood plains were

connected to complex webs of braids and distributary channels. Side channels and sloughs provided a large area of edge habitat and a variety of thermal and velocity regimes. Areas of upwelling often occur at the confluence of streams (Columbia/Yakima, Yakima/Toppenish, Toppenish/Simcoe, Yakima/Ahtanum/Wide Hollow, Naches/Rattlesnake, Yakima/Teaaway), and these areas are especially diverse. For salmon and steelhead, the side channel complexes and cool water refuges increase productivity, carrying capacity, and life history diversity by providing suitable habitat for all freshwater life stages in close physical proximity.

**Table D-5 Habitat condition score & bin by stream reach**

Reach Code	Reach Name	Prioritization Score	Bin
Lower Yakima (WRIA 37)			
3701	Lower Yakima River (Reach 1)	13	2
3702	Lower Yakima River (Reach 2)	11	2
3703	Lower Yakima River (Reach 3)	14	2
3704	Lower Yakima River (Reach 4)	16	3
3705	Lower Yakima River (Reach 5)	16	3
3706	Satus Creek	13	2
3707	Toppenish Creek	12	2
3708	Simcoe Creek	10	1
3709	Ahtanum Creek	12	2
3710	North Fork Ahtanum Creek	14	2
3711	Wide Hollow Creek	9	1
Naches River (WRIA 38)			
3801	Naches River (Reach 1)	14	2
3802	Naches River (Reach 2)	16	3
3803	Cowiche Creek	14	2
3804	South Fork Cowiche Creek	18	3
3805	Tieton River	10	1
3806	Rattlesnake Creek	16	3
3807	Gold Creek	15	2
3808	Little Naches River	18	3
3809	Bumping River	18	3
Upper Yakima (WRIA 39)			
3901	Upper Yakima River (Reach 1)	11	2
3902	Upper Yakima River (Reach 2)	15	2
3903	Upper Yakima River (Reach 3)	16	3
3904	Upper Yakima River (Reach 4)	19	3
3905	Upper Yakima River (Reach 5)	18	3
3906	Wenas Creek	6	1
3907	Burbank Creek	9	1
3908	Wilson Creek	7	1
3909	Cherry Creek	8	1

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

Reach Code	Reach Name	Prioritization Score	Bin
3910	Parke Creek	7	1
3911	Cooke Creek	7	1
3912	Caribou Creek	7	1
3913	Naneum Creek	6	1
3914	Coleman Creek	7	1
3915	Schnebly Creek	7	1
3916	Mercer Creek	7	1
3917	Reecer Creek	9	1
3918	Whiskey Creek	6	1
3919	Currier Creek	9	1
3920	Manastash Creek	12	2
3921	Dry Creek	6	1
3922	Taneum Creek	12	2
3923	Swauk Creek	14	2
3924	First Creek	16	3
3925	Williams Creek	13	2
3926	Teanaway River	15	2
3927	North Fork Teanaway River	17	3
3928	Cle Elum River	18	3
3929	Big Creek	14	2
3930	Little Creek	14	2

### ***Flow Condition***<sup>3</sup>

Surface water supply for the Yakima Reclamation Project comes from the natural, unregulated runoff of the Yakima River and its tributaries, irrigation return flows, and releases of stored water from the five main reservoirs in the upper Yakima and Naches river basins: Keechelus, Kachess, Cle Elum, Tieton, and Bumping. The reservoirs store approximately 30 percent of the average annual runoff in the basin and are operated to meet irrigation demands, flood-control needs, and instream flow requirements. The Yakima Project also provides water for hydroelectric power generation, fish and wildlife benefits, and recreation.

The Yakima Project depends heavily on the timing of unregulated spring and summer runoff from snowmelt and rainfall. The spring and early summer natural runoff supplies most river basin demands through June in an average year. Since the majority of spring and summer runoff is from snowmelt, the snowpack is often considered a “sixth reservoir.” In most years, the five major reservoirs are operated to maximize storage in June, which typically coincides with the end of the major natural runoff. Demand for water from the Yakima River cannot always be met in

<sup>3</sup> Adapted from Proposed Yakima Basin Integrated Water Resource Management Plan, 2011; and *Yakima River Basin Study Instream Flow Needs Technical Memorandum*, Anchor QEA with YRBWEP Instream Flow Needs Subcommittee, 2011

years with below-average runoff. A poor water year sets in motion the process of equally reducing the amount of water delivered to junior (“proratable”) water-right holders during the irrigation season.

The reservoirs have a combined storage capacity of about 1.07 million acre-feet. The irrigation divisions in the Yakima Project (Kittitas, Roza, Sunnyside, Tieton, Wapato and Kennewick) have entitlements totaling 2.04 million acre-feet. Most of those entitlements (1.94 million acre-feet) are diverted above the Reclamation stream gauge at Parker, the main control point for the Yakima Project. Other surface-water users that are not part of the Yakima Project rely on flow in the Yakima and Naches rivers. Entitlements above the Parker Gage total 470,000 acre-feet for these users.

Yakima Project operations cause reduced summer, early fall and winter stream flows, and unnaturally high summer flows in some river reaches, inhibiting migration, spawning, and rearing conditions for anadromous fish populations in the basin. In most years, as a result of Yakima Project operations, spring flows in the middle and lower Yakima River are not sufficient to optimize smolt outmigration. Summer flows in many reaches of the basin are too low in most years to provide desired conditions for salmonid survival and production. In other stream reaches, late-summer high flows related to project operations disrupt salmonid rearing

Through the YRBWEP Integrated Planning process, consultants and an Instream Needs Subcommittee characterized Yakima Basin reach-specific flow problems and developed recommended flow objectives, reach prioritization (high, medium or low), species benefitted, and actions to address the flow objectives, including both qualitative and quantitative targeted improvements. Fifteen mainstem reaches and eight tributaries or groups of tributaries within the Yakima Basin were reviewed, and ultimately nine mainstem reaches with high priority flow objectives were identified (Table D-6).

A number of instream flow studies and recommendations have been published for the Yakima River Basin<sup>4</sup>. Flow recommendations by reach for selected instream flow studies including the following:

- Flow recommendations from the Instream Flow Technical Advisory Group (IFTAG) published in 1984 (IFTAG, 1984)
- Flow recommendations from U.S. Fish and Wildlife Service (USFWS) provided in 1981 to Yakima County Superior Court for the Acquavella adjudication (Simmons, 1981)
- Operational flows described in the Interim Comprehensive Operating Plan (IOP) (Reclamation, 2002)
- Flow recommendations provided in Draft Planning Report/EIS Yakima River Water Storage Feasibility Study (Reclamation and Ecology, 2008)

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4 Flow recommendations by reach for selected instream flow studies are summarized in Table A-1 in Appendix A of the Yakima River Basin Study *Instream Flow Needs Technical Memorandum*, U.S. Bureau of Reclamation Contract No. 08CA10677A ID/IQ, Task 3, Anchor QEA with YRBWEP Instream Flow Needs Subcommittee, 2011.

- Flow recommendations provided in Discussion of Biologically Based Flows for the Purpose of Determination of Average Water Year Instream Flow Demand for the Yakima River Basin Study (Hubble, undated but provided to subcommittee in 2010). Joel Hubble is a fisheries biologist for Reclamation.

**Table D-6 YRBWEP Integrated Plan High Priority Reaches and Flow Objectives**

<b>Reach</b>	<b>High-Priority Flow Objectives</b>
Yakima River, Keechelus Dam to Lake Easton	<ul style="list-style-type: none"> <li>Reduce flows to 500 cfs during July.</li> <li>Ramp flows down from 500 cfs beginning August 1 to 120 cfs by the first week of September.</li> <li>Increase base flow to 120 cfs year-round.</li> <li>Provide one pulse flow (500 cfs peak) in early April.</li> <li>In drought years, provide an additional pulse of 500 cfs in early May.</li> </ul>
Yakima River, Easton Reach	<ul style="list-style-type: none"> <li>Increase September and October spawning flows to 220 cfs.</li> <li>Increase minimum flows to 250 cfs all other times for rearing which provides access to side channels.</li> </ul>
Cle Elum River	<ul style="list-style-type: none"> <li>Increase minimum flow to 500 cfs (previous analyses performed for Integrated Water Resource Management Alternative: Final EIS [Ecology, 2009] indicated 300 cfs could be provided so a range of 300-500 cfs will be tested in the hydrologic modeling).</li> <li>Decrease flows by 1,000 cfs beginning the first of August.</li> </ul>
Yakima River, Cle Elum to Teanaway River	<ul style="list-style-type: none"> <li>Ramp flows down starting July 1 to 1,000 cfs flow rate by August 31.</li> </ul>
Yakima River, Teanaway River to Roza Dam (Ellensburg Reach)	<ul style="list-style-type: none"> <li>Reduce flow by 1,000 cfs beginning July 1.</li> <li>Reach a flow of 1,000 cfs by August 31.</li> </ul>
Yakima River, Roza Dam to Naches River	<ul style="list-style-type: none"> <li>Increase flows in the spring to a minimum of 1,400 cfs.</li> <li>Increase flows in the fall and winter to a minimum of 1,000 to 1,400 cfs.</li> </ul>
Tieton River	<ul style="list-style-type: none"> <li>Increase minimum flows to 125 cfs from late October to April 1.</li> </ul>
Lower Naches River	<ul style="list-style-type: none"> <li>Increase minimum flow rate to 550 cfs from June 1 to November 1.</li> <li>Change the ramping rates from spring to summer flows to a more gradual decline.</li> <li>Reduce September flows to as close as possible to unregulated conditions.</li> </ul>
Yakima River, Parker to Toppenish Creek (Wapato Reach)	<ul style="list-style-type: none"> <li>Provide a spring pulse of 15,000 to 20,000 acre-feet in early May in dry years.</li> <li>Change ramping rate at end of high flows that occur in June-July in average to wet years.</li> </ul>
Manastash, Taneum, Cowiche Creeks	<ul style="list-style-type: none"> <li>Replace current diversions with Yakima or Naches River water; deliver water directly to tributaries if supply replacement is not feasible. No specific flow objectives were identified.</li> </ul>
Ahtanum Creek	<ul style="list-style-type: none"> <li>No flow objectives or augmentation alternatives were identified by subcommittee.</li> </ul>

Of the fifty reaches defined in the Yakima Basin, twenty-nine have gauge data that contributed to this project. There are two un-gauged streams for which NHD+ flow estimates could not be generated. We did not attempt to use federal flow targets for CRIA evaluation because of their complexity related to water supply forecast, nor did we attempt to use the objectives provided in the Integrated Plan; evaluations of actual regulated flows against both those sets of objectives and others are available in the vast body of literature devoted to the Yakima River Basin.

The water right data we evaluated for CRIA do not incorporate diversions for the federal Reclamation Project, so while they were useful for evaluating tributaries to the Yakima mainstem, this information has limited usefulness when evaluating diversions on the mainstem.

Color / Bin Score

3 = High/Good
2 = Average / Fair
1 = Low / Poor

**Table D-7 Flow condition score & bin by stream reach**

Reach Code	Reach Name	Prioritization Score	Bin
Lower Yakima (WRIA 37)			
3701	Lower Yakima River (Reach 1)	4	3
3702	Lower Yakima River (Reach 2)	5	3
3703	Lower Yakima River (Reach 3)	2	3
3704	Lower Yakima River (Reach 4)	5	3
3705	Lower Yakima River (Reach 5)	2	3
3706	Satus Creek	3	3
3707	Toppenish Creek	2	3
3708	Simcoe Creek	15	2
3709	Ahtanum Creek	16	2
3710	North Fork Ahtanum Creek	12	2
3711	Wide Hollow Creek	24	1
Naches River (WRIA 38)			
3801	Naches River (Reach 1)	24	3
3802	Naches River (Reach 2)	7	3
3803	Cowiche Creek	10	1
3804	South Fork Cowiche Creek	12	1
3805	Tieton River	4	2
3806	Rattlesnake Creek	2	2
3807	Gold Creek	24	2
3808	Little Naches River	7	3
3809	Bumping River	10	3
Upper Yakima (WRIA 39)			
3901	Upper Yakima River (Reach 1)	4	3
3902	Upper Yakima River (Reach 2)	4	3
3903	Upper Yakima River (Reach 3)	3	3
3904	Upper Yakima River (Reach 4)	7	2
3905	Upper Yakima River (Reach 5)	3	3

Reach Code	Reach Name	Prioritization Score	Bin
3906	Wenas Creek	27	1
3907	Burbank Creek	12	2
3908	Wilson Creek	7	2
3909	Cherry Creek	3	3
3910	Parke Creek	27	1
3911	Cooke Creek	27	1
3912	Caribou Creek	27	1
3913	Naneum Creek	12	2
3914	Coleman Creek	44	1
3915	Schnebly Creek	24	1
3916	Mercer Creek	12	2
3917	Reecer Creek	21	1
3918	Whiskey Creek	44	1
3919	Currier Creek	24	1
3920	Manastash Creek	18	1
3921	Dry Creek	27	1
3922	Taneum Creek	14	2
3923	Swauk Creek	18	1
3924	First Creek	24	1
3925	Williams Creek	24	1
3926	Teaway River	9	2
3927	North Fork Teaway River	6	2
3928	Cle Elum River	5	3
3929	Big Creek	24	1
3930	Little Creek	15	2

## 4. Reach Results

Following are results of reach-by-reach CRIA scoring. We have also included information gleaned from the YRBWEP process for reference. The nine high-priority flow objective reaches are listed below, along with their associated CRIA reach name and number<sup>5</sup>.

CRIA Reach	YRBWEP High Priority Reach
<a href="#">3704 Lower Yakima River (Reach 4)</a>	Toppenish to Parker Dam (“Wapato Reach”)
<a href="#">3801 Naches River (Reach 1)</a>	Lower Naches River
<a href="#">3805 Tieton River</a>	Tieton River
<a href="#">3901 Upper Yakima River (Reach 1)</a>	Naches River to Roza Dam
<a href="#">3902 Upper Yakima River (Reach 2)</a>	Roza Dam to Teanaway (“Ellensburg Reach”)
<a href="#">3903 Upper Yakima River (Reach 3)</a>	Teanaway River to Cle Elum River
<a href="#">3904 Upper Yakima River (Reach 4)</a>	Cle Elum River to Lake Easton (“Easton Reach”)
<a href="#">3905 Upper Yakima River (Reach 5)</a>	Lake Easton to Keechelus Dam
<a href="#">3928 Cle Elum River</a>	Cle Elum River

Summaries of the YRBWEP Instream Needs Subcommittee recommendations for these nine reaches are included within the CRIA reach scoring descriptions provided below, and can be identified by their different text font and color, as demonstrated by this paragraph.

### 3701 Lower Yakima River (Reach 1)

(Mouth to Chandler Canal Return)

Fish	Habitat	Flow
3	2	3

#### Fish Status/Utilization

The lower mainstem Yakima River has high use by most stocks. Many of the stocks utilize the mainstem as a migration corridor, both as adults returning to their natal spawning grounds and as juveniles rearing and moving to the ocean. As a result the Lower Yakima River Reach 1 ranks ‘high’ for fish utilization. The only stock not present in this reach is bull trout, which is typically found in cooler waters. The other eleven stocks utilize this reach for adult migration and juvenile rearing. The Yakima River Bright Fall Chinook is the only stock to spawn in this reach.

Fish Status/Utilization scoring detail is available on Table D-8.

<sup>5</sup> from Section 5.0 of *Yakima River Basin Study Instream Flow Needs Technical Memorandum*

## Habitat

The Lower Yakima River Reach 1 includes the Yakima River Delta. The delta and the lower 2.1 miles are in USCOE ownership to accommodate the 500-year floodway for McNary Dam pool. Riparian areas include mature tall canopy trees dominated by cottonwood, alder, Russian olive trees, and scrub willows up to RM 9.0. Some of the tall canopy continues upstream but there is more thick underbrush interspersed with reed canary grass up to RM 18.0. Five miles of this respective shoreline and 2,000 acres of connected floodplain is managed an extensive natural wetland complex with healthy natural riparian buffers.

The reach from Kiona to the mouth contains good riffles and pools. There are several islands that consist mostly of grasses and willow shrubs. Floodplain connectivity is moderately healthy except along a 1.3 mile right bank<sup>6</sup> levee and a short state highway section, which can limit channel migrations.

The upper portion of Lower Yakima River Reach 1 is surrounded by basalt cliffs that limit the riparian values. There are several small natural drainages that provide spawning and rearing habitat at the confluences and in the respective lower tributary reaches. The source of flow in the small drainages, which is cool water during the summer and warm in the winter, is from springs, groundwater seepage, and irrigation return flows. Many of the small islands act as side channels during low flows.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 1,695 cfs in August and the peak is 4,046 cfs in March. Minimum flow is 57 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score.

Flow scoring detail is available on Table D-10.

## 3702 Lower Yakima River (Reach 2)

(Chandler return to Prosser Dam)

Fish	Habitat	Flow
3	2	3

## Fish Status/Utilization

Lower Yakima River Reach 2 is also highly used by eleven out of twelve stocks as a migration corridor, both by adults returning to their natal spawning grounds and juveniles rearing and moving to the ocean. Yakima River Bright Fall Chinook is the only stock to spawn in this reach and bull trout are not present.

<sup>6</sup> "Right bank" (RB) and 'left bank" (LB) are codes for shorelines of the river when the viewer is facing downstream. For the Yakima system, RB is usually the south or west shore of the stream.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Lower Yakima River Reach 2 is the most flow critical reach in the Lower Yakima River. A large irrigation and hydropower point of diversion (POD) is at the upper end of the reach at Prosser Dam. As much as 75% of the total river is diverted during the summer. Dewatering of fall chinook redds in the bypass reach is an issue when power generation resumes after the fall screen maintenance period. Water depth late in the summer can limit upstream passage for large bodied spring and summer Chinook as well as smaller sockeye. Other than the critical low flow impacts, this reach provides some cool water refuge to juveniles and adults in the few pools that exist.

There are a few islands and side channels, naturally narrow riparian buffers, and a small floodplain because of natural steep shorelines. Small creeks and seeps drain into the Yakima River in this reach. Most of the developed land is above the floodplain terrace, and includes orchards, pastures, alfalfa fields, and residences.<sup>7</sup>

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 627 cfs in August and the peak is 4,409 cfs in May. Minimum flow is 24 percent of the average; reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. As noted above, there are significant diversions in this reach.

Although most flow attributes in this reach scored 'fair' to 'poor,' the overall high mean annual flow volume for this reach weighted the "bin" score to the 'good' range.

Flow scoring detail is available on Table D-10.

## 3703 Lower Yakima River (Reach 3)

(Prosser Dam to Toppenish Creek)

Fish	Habitat	Flow
3	2	3

### Fish Status/Utilization

Like reaches 1 and 2, Lower Yakima River Reach 3 has a high fish utilization rating. All stocks of spring and fall Chinook, Summer Steelhead, coho and sockeye continue to use this reach for a migration corridor, both as adults returning to their natal spawning grounds and as juveniles rearing and moving to the ocean. Not only do

<sup>7</sup> This and the following habitat descriptions are liberally adapted from *Habitat Limiting Factors: Yakima River Watershed Water Resources Inventory Area 37-39 Final Report* (D. Haring, 2001) and updated to reflect current conditions.

Yakima River Bright Fall Chinook utilize the reach for juvenile and adult migration, this stock spawns in Lower Yakima River Reach 3. Bull trout are not present.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

The upper 15 miles of this reach includes side channels, backwater areas, and diverse habitat types; the downstream 18 miles are characterized by a low-gradient single channel with little habitat diversity. Small and large irrigated farms as well as residential developments occupy most of the shorelines downstream of Mabton (RM 59.8). Throughout much of this reach the river channel is incised and disconnected from the natural floodplain. Many of the old river oxbows are undeveloped but remain perched above the surface waters except during severe flood events. Below Mabton there is very little natural riparian buffer except along the 3.5 miles of WDFW Wildlife Area. The RB upper portions of the Lower Yakima River Reach 3 border the Yakama Indian Nation Reservation. Satus and Toppenish creeks are the two major tributaries in this reach, with additional significant inflow from ground water and irrigation returns.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 1,500 cfs in August and the peak is 4,930 cfs in May. Minimum flow is 45 percent of the average; reaches with August flows between 33% and 66% of average scored 'fair' for this component of the flow element score.

Flow scoring detail is available on Table D-10.

## 3704 Lower Yakima River (Reach 4)

(Toppenish Creek to Parker [Sunnyside] Dam)

Fish	Habitat	Flow
3	3	3

"The instream flow objectives in the Wapato reach (Parker Dam to Toppenish) are to improve spring smolt outmigration in dry years and summer rearing conditions. From March through June, the Wapato reach is a primary migration corridor for all salmonid smolts produced upstream in the basin (spring and fall Chinook, steelhead, coho, and sockeye). Providing an early May flow pulse of 15,000 to 20,000 acre-feet in dry years would improve flow conditions over current conditions, which can be inadequate to support outmigration in drought years. A spring pulse may also provide a small benefit to adult spring Chinook and steelhead migrating through this reach in May to upstream spawning areas.

"The Wapato Reach is also a primary rearing area for coho and fall Chinook, and although fall Chinook smolts migrate out of this reach by the end of June, coho rear in this reach year-round. This reach is an important overwintering area for juvenile spring Chinook, coho, and steelhead. Maintaining an increased base flow condition year-round would benefit all rearing salmonids that remain in this reach year-round. It would also improve spawning conditions for fall Chinook and coho that spawn in this reach in fall through early winter."

### **Fish Status/Utilization**

Fish utilization in Lower Yakima River Reach 4 begins to differ from reaches 1 through 3. Stocks that only use lower tributaries begin to drop out and other stocks begin to utilize the reach for spawning. The spring Chinook, Marion Drain Fall Chinook, and Upper Yakima River Summer Steelhead continue to use the reach for adult migration and juvenile rearing and migration. Naches Summer Steelhead and coho are utilizing the reach for spawning, juvenile rearing and adult migration life cycle stages a long with Yakima River Bright Fall Chinook. Satus Creek Summer Steelhead is no longer present and Toppenish Creek Summer Steelhead has reduced utilization to juvenile rearing. In addition, this is the lowest reach on the Lower Yakima River mainstem in which bull trout are present. Bull trout use Reach 4 for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

### **Habitat**

This reach is considered one of the most structurally complex and diverse sections of the Yakima River. For most of the reach, the highway constrains the floodplain on the west side of the river, whereas the other side of the floodplain is in a semi-natural state with numerous side-channels, braids, and backwater areas. The historic Yakima River floodplain was miles wide in Reach 4, and remnant sections remain, albeit at a much reduced cross sectional value. Before irrigation shut off (September 15 to October 1) fish passage can be problematic because of surface flows spreading amid the numerous braided channels. The riparian zones are wide with tall canopy trees. **Habitat Condition**

The Yakima River drains an area of 15,900 square km (6,155 square miles) and contains about 3058 km (1,900 river miles) of perennial streams. Originating near the crest of the Cascade Range above Keechelus Lake, the Yakima River flows 344 km (214 miles) southeastward to its confluence with the Columbia River at RM 335.2. Major tributaries include the Kachess, Cle Elum and Teanaway rivers in the northern part of the subbasin, and the Naches River in the west. The Naches has four major tributaries, the Bumping, American, Tieton and Little Naches rivers. Ahtanum, Toppenish and Satus creeks join the Yakima in the lower subbasin. Six major reservoirs are located in the subbasin and form the storage component of the federal Yakima Project, managed by the Bureau of Reclamation. The Yakima River flows out of Keechelus Lake (157,800 acre feet), the Kachess River from Kachess Lake (239,000

acre feet), the Cle Elum River from Cle Elum Lake (436,900 acre feet), the Tieton from Rimrock Lake (198,000 acre feet), and the Bumping from Bumping Lake (33,700 acre feet). The North Fork of the Tieton River connects Clear Lake (5,300 acre feet) with Rimrock Lake. All reservoirs except Rimrock and Clear Lake were natural lakes before impoundment.

Vegetation in the subbasin is a complex blend of forest, range (grass lands and shrub steppe) and cropland. Over one-third of the land in the Yakima Subbasin is forested. Rangeland lies between cultivated areas, located in the fertile lower valleys, and the higher-elevation forests. Almost all shrub-steppe habitats in the subbasin are supported by highly fragile soils that are easily eroded. Riparian conditions are extremely varied, ranging from severely degraded to nearly pristine. Good riparian habitat generally is found along forested, headwater reaches, whereas degraded riparian habitat is concentrated in the valleys, frequently associated with agricultural and residential activity (especially streamside grazing, tillage, or mowing).

The predominant types of land use in the Yakima Subbasin include irrigated agriculture (1,000 square miles), urbanization (50 square miles), timber harvest (2,200 square miles) and grazing (2,900 square miles). Cropland accounts for about 16% of the total subbasin area of which 77% is irrigated. About two-thirds of the floodplain gravel mining in Washington State occurred along the Yakima River or the lower reaches of two of its tributaries, the Cle Elum and Naches Rivers. The Selah Pit and surrounding pits comprise the largest pit complex in the state, at more than 230 acres in 1986.

Five distinct channel provinces are very apparent along the altitudinal gradient from source to mouth; 1) high gradient, largely constrained headwaters, 2) braided alluvial flood plains, 3) constrained canyons, 4) meandering with expansive flood plains containing oxbows, and 5) delta flood plain at the confluence with the Columbia River.

The Columbia River basalts, located within the Columbia Plateau, represent a locally important aquifer system. The overlying alluvial aquifers are highly permeable and are heterogeneous and anisotropic, due to their deposition within the fluvial environment. The rocks of the Cascade Mountain province store and transmit little water via aquifer system while the majority of runoff occurs as overland flow.

Scientists characterized the historical hydrologic cycle in the Yakima Basin as an extensive exchange between the surface, hyporheic, and groundwater zones. This exchange occurred mainly in the vast alluvial valleys and flood plains, which functioned as hydrologic buffers, distributing the energy of peak flows and moving cool, spring melt water out onto the flood plains. This annual recharge of the shallow, near surface aquifers often occurred well into summer due to extensive and long-lasting snow pack in the Cascades. Groundwater recharge of this nature provides a source of groundwater that maintains base flow and a cool thermal refuge as summer progresses and air temperatures increase, as well as maintaining warmer winter temperatures that prevent or reduce the risk of anchor ice.

Reaches associated with alluvial flood plains are centers of biological productivity and ecological diversity in gravel-bed rivers. In the Yakima basin, bedrock constrictions between alluvial subbasins control the exchange of water between streams and the aquifer system. Under pre-development conditions, vast alluvial flood plains were connected to complex webs of braids and distributary channels. Side channels and sloughs provided a large area of edge habitat and a variety of thermal and velocity regimes. Areas of upwelling often occur at the confluence of streams (Columbia/Yakima, Yakima/Toppenish, Toppenish/Simcoe, Yakima/Ahtanum/Wide Hollow, Naches/Rattlesnake, Yakima/Teaway), and these areas are especially diverse. For salmon and steelhead, the side channel complexes and cool water refuges increase productivity, carrying capacity, and life history diversity by providing suitable habitat for all freshwater life stages in close physical proximity.

Table D-5Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 514 cfs in September and the peak is 3,408 cfs in May. Minimum flow is 23 percent of the average. Although flow in this reach is poor, as noted above, the overall high mean annual flow volume for this reach weighted the score to the ‘good’ range.

Flow scoring detail is available on Table D-10.

## 3705 Lower Yakima River (Reach 5)

(Parker [Sunnyside] Dam to Naches River)

Fish	Habitat	Flow
3	3	3

### Fish Status/Utilization

Nine stocks use Lower Yakima River Reach 5, leading to a ‘high’ fish utilization rating. Of the stocks present American River, Upper Yakima River, and Naches Spring Chinook, Upper Yakima Summer Steelhead, bull trout and sockeye use the reach for rearing and adult migration. The other three stocks, Yakima Bright Fall Chinook, Naches Summer Steelhead, and coho, utilize the reach for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Lower Yakima River Reach 5 borders the Cities of Yakima and Union Gap and is characterized by numerous side channels, islands, and backwater areas. The full extent of the natural floodplain through much of this reach is confined by I-82/US 12, levees, rock quarries, and other development. Union Gap is a natural basalt

geographic pinch point that divides the complex upstream and downstream floodplains.

Riparian values are healthy except where development has occurred. At Parker Dam a significant portion of the surface flow is diverted. When combined with the larger diversion that also lies in the 4 mile reach between Union Gap and Parker Dam, flows often reach a minimum for the entire Yakima River. There are numerous irrigation return flows that supplement the river downstream of Parker Dam.

Habitat scoring detail is available on Table D-9.

### **Flow**

Gauge:Yes The minimum of monthly mean flows in this reach is 1,871 cfs in October and the peak is 6,252 cfs in May. Minimum flow is 52 percent of the average. Although flow in this reach can be poor, as noted above, the overall high mean annual flow volume for this reach weighted the score to the 'good' range.

Flow scoring detail is available on Table D-10.

## 3706 Satus Creek

(Mouth to Logy Creek)

Fish	Habitat	Flow
3	2	3

### Fish Status/Utilization

Satus Creek is primary tributary to the lower Yakima River Mainstem. This reach also has a 'high' fish utilization rating. Of the twelve stocks in this basin complex, only two stocks utilize this reach for spawning, rearing, and adult migration. Those stocks are Satus Creek Summer Steelhead and coho. In contrast, sockeye, and bull trout are not present whereas the remaining eight stocks utilize this reach for juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Satus Creek enters the right bank of the Yakima River at RM 69.6. The Satus Creek watershed is topographically steep, ranging from 5,500 feet at the headwaters of Satus Creek on the north slope of the Simcoe Mountains to 650 feet at its confluence with the Yakima River. The headwaters of Satus Creek and all of its major tributaries start in the forest zone. The majority of the watershed (approximately 75% of the total area) is comprised of shrub-steppe rangelands. Streams run through deep canyons. The lower eight stream miles of Satus Creek flow through irrigated valley to the confluence with the Yakima River. Barrier falls are located in the upper reaches of Satus Creek.

Large areas of the Satus watershed have suffered riparian damage in both headwater source areas and spawning and rearing habitat in the forested portions of the anadromous fish bearing streams. In general, riparian function is degraded in the lower watershed, but improves with increasing elevation.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:No An NHD+ estimated 117 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## 3707 Toppenish Creek

(Mouth to Simcoe Creek)

Fish	Habitat	Flow
3	2	3

### Fish Status/Utilization

Fish utilization in Toppenish Creek is high. Six stocks utilize this reach for juvenile rearing, many for the entire year. These stocks are American River, Upper Yakima River, and Naches Spring Chinook, Marion Drain Fall Chinook, Naches Summer Steelhead and Upper Yakima River Summer Steelhead. Along with juvenile rearing, Toppenish Creek Summer Steelhead, coho, and Yakima River Bright Fall Chinook use the creek for spawning and adult migration. Satus Creek summer Steelhead, bull trout and sockeye are not present.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Toppenish Creek enters the RB of the Yakima River at River Mile 80.4. The watershed is subdivided into two topographic portions; the upper watershed is comprised of largely undeveloped forest and rangelands, and the lower watershed is agricultural valley bottom. Habitat conditions in the uppermost 25 miles of Toppenish Creek are good, with the major problem in these upper reaches being a number of large, slightly perched culverts that present partial or complete barriers to upstream juvenile or adult fish passage. Substrate condition is excellent in the upper 25 miles of Toppenish Creek with abundant gravel of very high quality. Toppenish Creek channel throughout much of the lower reach is in poor condition, with problems related to passage, stranding, entrainment, and temperature.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:No An NHD+ estimated 2,845 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### 3708 Simcoe Creek

(Mouth to Wahtum Creek)

Fish	Habitat	Flow
1	1	2

#### Fish Status/Utilization

Simcoe Creek is a tributary to Toppenish Creek. This creek rates ‘low’ for fish utilization. The only two stocks present are coho and Toppenish Creek Summer Steelhead, which utilize the reach for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Simcoe Creek is a LB tributary to Toppenish Creek, entering at RM 32.7. The entirety of the NF and SF of Simcoe Creek, are canyon streams, draining forested plateaus and mountains. Simcoe Creek is diverted at the Simcoe Feeder Canal (RM 13.9), and can dry up in a 4-mile reach downstream. At the lower end of the dewatered reach, springs maintain surface flow. Much of the Simcoe Creek channel is moderately to severely incised and disconnected from its historic floodplain, resulting in channel erosion, straightening, and simplification, along with poor substrate quality. Riparian is characterized by patches of very dense riparian vegetation interspersed with larger open areas with little or no vegetation, resulting in few reaches with extensive shade. Riparian condition in mainstem Simcoe Creek is poor to fair.

Habitat scoring detail is available on Table D-9.

#### Flow

Gauge:No An NHD+ estimated 41 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### 3709 Ahtanum Creek

(Mouth to Ahtanum Creek forks)

Fish	Habitat	Flow
3	2	2

#### Fish Status/Utilization

Ahtanum Creek is a primary tributary to the lower Yakima River mainstem. Many of the stocks that utilize the mainstem for adult migration and juvenile rearing also use Ahtanum Creek for juvenile rearing. American River, Naches, and Upper Yakima River Spring Chinook, along with Yakima River Fall Bright, and Upper Yakima Summer Steelhead use this reach for juvenile rearing. Adult and juvenile bull trout move

downstream for feeding and rearing. In addition, coho and Naches Summer Steelhead utilize the creek for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Ahtanum Creek is a RB tributary to the lower Yakima River, entering at RM 106.9. The NF and SF merge to form Ahtanum Creek at RM 23.1. Low elevation riparian areas are highly modified, scoring 'fair' for each of the habitat attributes.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 18 cfs in August and the peak is 193 cfs in May. Minimum flow is 23 percent of the average; reaches with August flows less than 33% of average scored 'poor' for this component of the flow element score. Flow scoring detail is available on Table D-10.

## 3710 North Fork Ahtanum Creek

(Mouth to Nasty Creek)

Fish	Habitat	Flow
2	2	2

### Fish Status/Utilization

Fish utilization in North Fork Ahtanum Creek is rated 'average.' Three stocks are present, two of which are listed under the ESA. Naches Summer Steelhead and coho utilize the creek for spawning, rearing and adult migration whereas bull trout use the reach for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Disturbance and structures within the channel migration zone occur in the lower segment of NF Ahtanum Creek, confining channels and resulting in the failure of channels to naturally respond to channel disturbances. Fine sediments recruit to the streambed, undermining culverts in this area. Riparian condition is generally fair but differs from Ahtanum Creek in that off-channel habitat and rearing conditions are good. Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 21 cfs in October and the peak is 199 cfs in May. Minimum flow is 29 percent of the average. Flow scoring detail is available on Table D-10.

### 3711 Wide Hollow Creek

(Mouth to Dazet Road, Harwood)

Fish	Habitat	Flow
2	1	1

#### Fish Status/Utilization

Wide Hollow is another tributary to the lower Yakima River mainstem, but in this case the creek rated 'average' for fish utilization. Marion Drain Fall Chinook, Satus Creek Summer Steelhead, Toppenish Creek Summer Steelhead, bull trout, and sockeye are not present. Of the remaining seven stocks, Upper Yakima Summer Steelhead, Yakima River Bright Fall Chinook, and Naches, Upper Yakima River and American river Spring Chinook utilize Wide Hollow Creek for juvenile rearing. The remaining two stocks, Naches Summer Steelhead and coho, utilize the reach for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Wide Hollow Creek is a RB tributary to the lower Yakima River, entering at RM 107.4. The stream flows along the southern edge of Union Gap and Yakima, and suffers many of the problems associated with urban streams, including stormwater runoff, leaky septic tanks, and poor riparian condition, consisting of narrow buffer with clumps of mature willow that provide shaded areas interspersed with sunny areas.

Habitat scoring detail is available on Table D-9.

#### Flow

Gauge:No An NHD+ estimated 8 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## WRIA 38 - Naches Basin

### 3801 Naches River (Reach 1)

(Mouth to Tieton River)

Fish	Habitat	Flow
3	2	3

"The instream flow objective in the Lower Naches River is to improve fish-rearing conditions. Summer flows are low and the ramping rate from high spring flows to summer flows is abrupt, negatively affecting rearing conditions for steelhead, coho, and spring Chinook. Changing the ramping rates so the decline from spring flows to summer flows is less abrupt, and increasing base flows to 550 cfs from early June to early November, would benefit spring Chinook, steelhead, and coho rearing in this reach year-round. A more gradual decrease in flow to a higher base flow would allow rearing salmonids to more easily avoid stranding and entrapment, provide access to additional available rearing habitat, and potentially contribute to improving water quality. Habitat access benefits would be most pronounced during drought years.

"Coho spawn in this reach from mid-September to mid-December. Coho may benefit from an increase in available spawning habitat due to increased base flows. Adult species that migrate through the lower Naches River during summer (spring Chinook and sockeye) and fall (steelhead and coho) would also have more habitat and improved water quality due to increased base flows. The effect on those benefits from flow loss to groundwater in the lower parts of this reach was identified as an issue by the subcommittee but is unknown.

"Reducing fall flows as much as possible in September, when high flows occur as a result of the flip-flop operations, would benefit spring Chinook, steelhead, and coho juveniles that rear in the lower Naches River and may overwinter there if not pushed out by high flows during flip-flop operations."

#### Fish Status/Utilization

Naches River Reach 1, a major tributary to the Yakima River mainstem, is rated 'high' for fish utilization. Eight stocks are present in this reach. Those species specific to the Lower Yakima River Basin or are just migrating along the mainstem to the upper basin are not present. Coho, Naches Summer Steelhead, and Yakima River Bright Fall Chinook utilize this reach for all three life cycle stages. In comparison bull trout, American River and Naches Spring Chinook utilize Naches River Reach 1 for juvenile

rearing and adult migration. Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook use the reach for juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Riparian condition in this reach is impacted by levee encroachment and roads, most notably, SR 12. Wetted channel substrate is composed primarily of large cannon ball-sized material embedded with sands and fines; it is unknown to what extent these substrate conditions are associated with flip-flop flows and interrupted sediment transport from the Tieton River. The floodway in this reach is broad, but flows during much of the year are confined to a narrow deep thalweg. There is gravel present in side-channels and high on the floodplain, but these areas are generally watered only during peak flows and flip-flop. Steelhead have greater access to these spawning gravels during spring runoff flows, but there is a high amount of sand present even on the floodway fringe. Low flows during the winter and early spring, and prolonged high and fluctuating flows in the summer are key characteristics of Naches River Reach 1.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 538 cfs in October and the peak is 3,741 cfs in May. The braided channels of the Naches River downstream of Wapatox Dam (RM 9.7-17.1) are substantially dewatered at flows of 125 cfs and below. In spite of these conditions, this reach ranks “good” for flow overall due to the magnitude of Mean Annual Flow.

Flow scoring detail is available on Table D-10.

## 3802 Naches River (Reach 2)

(Tieton River to Bumping River/Little Naches confluence)

Fish	Habitat	Flow
2	3	3

### Fish Status/Utilization

Fish utilization for Naches River Reach 2 is rated as ‘average.’ Three stocks found in Naches River Reach 1 are no longer present, leaving a total of five stocks utilizing Naches River Reach 2. Bull trout and American River Spring Chinook use this reach for juvenile rearing and adult migration. Naches Spring Chinook, Naches Summer Steelhead and coho spawn, rear, and migrate in this reach.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

The upper extent of Naches River Reach 2 is defined as the point where the Little Naches River and Bumping River converge to form the Naches. Riparian conditions in Naches River Reach 2 are dominated by SR 410, which runs the full length of this reach. There are also residences immediately adjacent to the stream, some agriculture, and several campgrounds that adversely affect riparian and channel conditions. In spite of this, the reach from Wapatox upstream to Bumping River is one of the best spawning reaches in the Naches watershed, with abundant spawning beds interspaced with deep, clear resting pools. There is increasing presence of gravels moving upstream from the Tieton, although there are still fines present in the gravels. Floodplain connectivity is moderate with problems areas near the residential developments. The floodplain is often narrow in size due to natural basalt canyons and mountainous terrain.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 526 cfs in October and the peak is 3,532 cfs in May. Flow scoring detail is available on Table D-10.

### 3803 Cowiche Creek

(Mouth to Cowiche Creek forks)

Fish	Habitat	Flow
2	2	1

## Fish Status/Utilization

Cowiche Creek is a primary tributary to the lower Naches River mainstem. This creek is rated as 'average' for fish utilization. Six stocks are present here, the majority of which only utilize the reach for juvenile rearing. Those stocks are American River and Naches Spring Chinook, Yakima River Bright Fall Chinook, and bull trout. Coho and Naches Summer Steelhead utilize Cowiche Creek for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

Cowiche Creek is a RB tributary to the Naches River, entering at RM 2.7. Lower Cowiche Creek and a number of tributary channels are used as off-channel winter refuge for pre-smolt spring chinook and steelhead. The lower two miles of the watershed are primarily agricultural, and the channel is re-routed against the side of the valley for agricultural convenience. Upstream for two to three miles, the channel is located in a naturally confined canyon, with few pools and LWD; fish use in this reach is primarily passage only. Upstream of the canyon, the mainstem extends through a low gradient agricultural area for about two miles to the forks. The stream

in this area is confined and incised in the floodplain, and has lost floodplain function. Riparian condition is generally good through the canyon (RM 2-5), but is generally poor through the agricultural areas.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is less than 1 cfs in August and the peak is 86 cfs in May. Minimum flow is 5 percent of the average; reaches with August flows less than 33% of average scored ‘poor’ for this component of the flow element score. Flow scoring detail is available on Table D-10.

## 3804 South Fork Cowiche Creek

(Mouth to Reynolds Creek)

Fish	Habitat	Flow
1	3	1

### Fish Status/Utilization

Fish utilization for South Fork Cowiche Creek is low. Only two stocks are present, Naches Summer Steelhead and coho. Both stocks utilize South Fork Cowiche Creek for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Conditions are ‘good’ for every habitat attribute.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 1 cfs or less in July-September and the peak is 29 cfs in May. Minimum flow is 8 percent of the average. Flow scoring detail is available on Table D-10.

## 3805 Tieton River

(Mouth to Tieton Dam)

Fish	Habitat	Flow
2	1	2

“The instream flow objective in the Tieton River is to improve fish-rearing conditions. Under present operations, winter flows are low (50 to 100 cfs) with limited variation in flow from November to early April. In September, flows are too high as a result of flip-flop operations (reducing flows in the upper arm of the

Yakima River and increasing flows in the Naches River with increased water releases from Rimrock Reservoir). Increasing winter base flows to 125 cfs from November to early April would benefit rearing spring Chinook and steelhead in the Tieton River. Early adult steelhead migrants into the Tieton River could also benefit by increased base flows. Adult steelhead migrate into the Tieton River from February through May.

"Spring Chinook and steelhead smolt outmigrants would benefit slightly because smolt outmigration may start as early as mid-March. Reducing flows in the Tieton River as much as possible in September would benefit spring Chinook and steelhead juveniles because they may overwinter in the Tieton River if they do not get pushed out by high flows during the flip-flop operation."

### **Fish Status/Utilization**

Tieton River is another tributary to the Naches River mainstem. Fish utilization for this river is rated 'average.' Five fish stocks are present, two of which limit their use to juvenile rearing. Those stocks are bull trout and American River Spring Chinook. Naches spring Chinook, Naches Summer Steelhead and coho utilize the Tieton River for spawning, rearing, and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

### **Habitat**

The Tieton River is a RB tributary to Naches River, entering at RM 17.5. Except for Oak Creek, tributaries to the Tieton downstream of Tieton Dam are small, flow through shrub-steppe, and sometimes go dry in the summer. The Tieton River and its floodplain are affected by development within the riparian zone including riprap associated with SR 12.

Because of the presence of Rimrock Dam, transport of bedload (coarse sediment, gravels) and LWD is essentially eliminated, impacting the substrate quality of the Tieton River. The increased incidence of bank-full flow events likely moved suitable spawning gravels out of the channel downstream of the dam, leaving an armored streambed that is less suitable for salmonid spawning and rearing. Riparian development and resulting erosion impair function through much of this reach. Low flows in the winter reduce the quality and quantity of rearing habitat, and high flows during flip-flop in late summer probably physically displace juveniles from the Tieton and lower Naches Rivers downstream into the Yakima River.

Habitat scoring detail is available on Table D-9.

### **Flow**

Gauge:Yes The minimum of monthly mean flows in this reach is 114 cfs in November and the peak is 1,510 cfs in September. Flow scoring detail is available on Table D-10.

### 3806 Rattlesnake Creek

(Mouth to McDaniel Diversion at 120° 57'15.3"W, 46° 48'47.1"N)

Fish	Habitat	Flow
2	3	2

#### Fish Status/Utilization

Rattlesnake Creek is also a tributary to the Naches River mainstem and has an 'average' fish utilization rating. Five stocks are present. Coho, Naches Summer Steelhead, and Naches Spring Chinook utilize the creek for all three life cycle stages. In comparison, American River spring Chinook use the reach for juvenile rearing, and bull trout utilize the reach for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Rattlesnake Creek is a RB tributary to the Naches River, entering at RM 27.8. In general, conditions in Rattlesnake Creek are 'fair' to 'good.' Downstream reaches have moderate slopes (2%) and a riffle/pool character, providing excellent fish habitat, although these channel habitats are very sensitive to disturbance. The alluvial fan is highly modified by channelization. This limits the area available for sediment deposition in the floodplain, resulting in chronic sediment build-up at the confluence with the Naches.

Habitat scoring detail is available on Table D-9.

#### Flow

Gauge:Yes Rattlesnake Creek drains very steep topography, and as a result has a very flashy runoff pattern, with widely varying flows. The minimum of monthly mean flows in this reach is 35 cfs in September and the peak is 254 cfs in June. Minimum flow is 43 percent of the average. There are few gauge data points for this reach. Flow scoring detail is available on Table D-10.

### 3807 Gold Creek

(Mouth to first left bank tributary at ~ RM 0.6)

Fish	Habitat	Flow
2	2	2

#### Fish Status/Utilization

Fish utilization for Gold Creek, a tributary to the Naches River mainstem, is rated as 'average.' Of the five stocks present, coho and Naches summer steelhead utilize the creek for spawning, rearing, and adult migration. Bull trout uses Gold Creek for

juvenile rearing and adult migration whereas Naches and American River Spring Chinook limit themselves to juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Gold Creek is a small LB tributary to the Naches River, entering at RM 38.5. Riparian functions remain intact except at the mouth, where there is an irrigation diversion. Habitat scoring detail is available on Table D-9.

### Flow

Gauge:No An NHD+ estimated 14 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## 3808 Little Naches River

(Mouth to North Fork Little Naches River)

Fish	Habitat	Flow
2	3	3

### Fish Status/Utilization

The Little Naches River is a primary tributary to the lower Naches River mainstem. The 'average' fish utilization rating can be attributed to the five stocks present in this reach. Coho, Naches Spring Chinook and Naches Summer Steelhead utilize the Little Naches River for spawning, rearing, and adult migration whereas bull trout use the reach for adult migration and juvenile rearing, and American River Spring Chinook use the reach for juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

The Little Naches River enters the Naches River from the west at RM 44.6; the confluence of the Little Naches with Bumping River marks the upstream end of Naches River Reach 2. There are no passage barriers to migrating fish at any of the forks of the Little Naches or the mouths of most tributaries, and a significant amount of suitable habitat is available.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 43 cfs in September and the peak is 761 cfs in May. Minimum flow is 16 percent of the average. Flow scoring detail is available on Table D-10.

## 3809 Bumping River

(Mouth to Bumping Dam)

Fish	Habitat	Flow
2	3	3

### Fish Status/Utilization

Five stocks utilize Bumping River, a tributary to the lower Naches River mainstem. Four of those stocks, Naches Spring Chinook, Naches Summer Steelhead, bull trout and coho spawn, rear, and migrate in this river. The remaining stock, American River Spring Chinook, uses Bumping River for juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

The terminus for the Bumping River reach is Bumping Dam, which the Bureau of Reclamation constructed in 1910 at RM 15.7. Channel gradient downstream of Bumping Dam is 1-2%; much of the substrate upstream of the American River confluence is boulders, with patches of spawning gravels used by spring chinook and steelhead. Bumping Road is located immediately adjacent to the Bumping River or within the floodplain for approximately 80% of the lower 12 miles of the river. The riparian corridor on the Bumping River is generally excellent, except in areas of streamside development.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 145 cfs in October and the peak is 661 cfs in June. Minimum flow is 49 percent of the average. This reach has a regulated hydrograph. Through the spring and summer, much of the Bumping Lake outflow is passed downstream to support instream flows and meet downstream irrigation demands. Additional reservoir drawdown typically occurs in September to augment flip-flop operations.

Flow scoring detail is available on Table D-10.

## 3901 Upper Yakima River (Reach 1)

(Naches R. to Roza Dam)

Fish	Habitat	Flow
3	2	3

"The instream flow objectives in the Roza Dam to Naches River reach are to improve conditions for fall and winter spawning and rearing and spring smolt outmigration. Increasing base flows from around mid-September through May would improve habitat quality and quantity for spring Chinook, steelhead, and coho that rear in this reach. Increased base flows during that period would also benefit adult salmonids, mostly coho, which migrate through this reach mid-September through mid-December on their way to spawning grounds in the upper Yakima River Basin, but also spawn in this reach during the fall and early winter. Increased flows could provide additional spawning habitat and may improve water quality conditions in the fall.

"Steelhead, which migrate through this reach beginning as early as March, would also benefit from increased base flows. Spring Chinook and sockeye also migrate through this reach on their way to spawning grounds, but they would benefit the least among the adult migrants because the majority of their spawning migration falls outside the period of increased base flows.

"Additional flows during smolt outmigration in the spring (March to May) would benefit all [anadromous] salmonid species in the Yakima River Basin: spring Chinook, steelhead, coho, and sockeye. Increasing spring flows should be coordinated with floodplain restoration efforts in this reach to maximize benefits."

### Fish Status/Utilization

Upper Yakima River Reach 1 from the Naches River to Roza Dam, is rated as 'high' for fish utilization. Nine stocks are present in this reach. Three stocks utilize Upper Yakima River Reach 1 for all three life cycle stages. Those stocks are Yakima River Bright Fall Chinook, Upper Yakima Summer Steelhead, and coho. Four stocks present limit their utilization of this reach to juvenile rearing. They include bull trout, Naches Summer Steelhead, Naches spring Chinook, and American River spring Chinook. The remaining two stocks, Upper Yakima River spring Chinook, and sockeye, utilize the river section for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

This reach borders the City of Yakima and is characterized by numerous side-channels, islands, and backwater areas. However, the full extent of the natural floodplain through much of this reach is confined by levees, and Yakima River floodplain function in the reach from the Naches River to Wenas Creek is degraded. Channel conditions from the Naches River confluence upstream to Wenas Creek are poor, with sparse riparian vegetation, collapsed streambanks, large width to depth ratio, and extremely scarce LWD presence. The river is confined in a canyon through the upper portion of this reach, with no side-channel complexes, few islands, and only a few backwater areas. As the river leaves the lower end of the canyon, it flows across a deep alluvial floodplain that is heavily mined for gravel.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 594 cfs in October and the peak is 1,923 cfs in May. Minimum flow is 47 percent of the average. This reach has a regulated hydrograph. Flow scoring detail is available on Table D-10.

## 3902 Upper Yakima River (Reach 2)

(Roza Dam to Teanaway River)

Fish	Habitat	Flow
2	2	3

"The instream flow objective in the Ellensburg reach is to improve fish-rearing conditions. Under present operations, flows are too high from July through early September when juvenile Chinook, steelhead, and coho are rearing in this reach. High summer flows reduce the amount of suitable rearing habitat for these species as a result of high water velocities. Juvenile salmon seek low-velocity habitat as protection against being pushed out of a reach and to minimize energy expenditures. The negative effects on rearing juvenile salmonids from high summer flow conditions in this reach occur during all water year types, but are most significant in wet years.

"It is desirable to occasionally augment spring flows to promote riparian restoration (with large flow pulses approximately every five years). In winter, flow pulses would provide access to available habitat when juvenile Chinook, steelhead, and coho are rearing in this reach."

## Fish Status/Utilization

Fish utilization in upper Yakima River Reach 2 is 'average.' Seven stocks that are present downstream are no longer present in this reach. Of the five remaining stocks,

three of them utilize the reach for all three life cycle stages. The three stocks are Upper Yakima River Spring Chinook, Upper Yakima Summer Steelhead, and coho. Bull trout utilize the reach for juvenile rearing whereas sockeye uses upper Yakima River Reach 2 for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Upper Yakima River Reach 2 flows through some distinct geographic features including the Yakima River Canyon between Selah and Ellensburg, the Ellensburg Valley, lower Kittitas Valley, and Ellensburg Canyon. In the Yakima River Canyon, the river is bordered almost continually on the right bank by a railroad tracks, and on the left by SR 821. The canyon’s natural confinement limits development of multiple channels, accumulations of LWD, or other channel complexity elements.

The river is confined through many of the other areas by levees, bank protection, and highways. Instream habitat complexity in the valleys features braided channels, islands, and healthier riparian zones. About three fourths of the river above Manastash Creek confluence is narrowed to a single thread, leaving a considerable number of isolated side channels. Bank sloughing is common, the riparian corridor is constricted or severely degraded, and LWD is swept away by constriction-induced increases in water velocity. At the upper end of this reach is a very complex floodplain, with a primary zone of upwelling and braiding around the Teanaway-Yakima confluence.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 1,125 cfs in October and the peak is 3,725 cfs in August. Minimum flow is 46 percent of the average. This reach has a regulated hydrograph. The ‘good’ flow rating for this reach is primarily attributed to the high overall flow volume.

Flow scoring detail is available on Table D-10.

## 3903 Upper Yakima River (Reach 3)

(Teanaway River to Cle Elum River)

Fish	Habitat	Flow
2	3	3

“The highest priority instream flow objective in the Cle Elum to Teanaway River reach is to improve fish-rearing conditions. Under present operations, flows are too high from July through early September (as high as 3,000 cfs in August) when juvenile Chinook and steelhead are rearing in this reach. Once coho are firmly reestablished in the upper Yakima River Basin, juvenile coho would also be rearing

in this reach. High summer flows reduce the amount of suitable rearing habitat for these species as a result of high water velocities. Juvenile salmon seek low-velocity habitat as protection against being pushed out of a reach and to minimize energy expenditures. The negative effects on rearing juvenile salmonids from high summer flow conditions in this reach occur during all water year types, but are most significant in wet years.

“It is desirable to occasionally augment spring flows to promote riparian restoration (with large flow pulses approximately every five years) and benefit migrating adult steelhead with smaller flow pulses when available. In winter, flow pulses would provide access to available habitat when juvenile Chinook, steelhead, and coho are rearing in this reach.”

**Fish Status/Utilization**

Upper Yakima River Reach 3 has the same fish utilization as Reach 2 therefore is rated as ‘average.’ Coho, Upper Yakima River Spring Chinook, and Upper Yakima Summer Steelhead all utilize Reach 3 for spawning, rearing, and migration. Sockeye use the river for juvenile rearing and adult migration whereas bull trout limit utilization to juvenile rearing. Fish Status/Utilization scoring detail is available on Table D-8.

**Habitat**

This reach is primarily a large main channel, with only a few side channels. Substrate in the upper reaches is composed mostly of cobble and large gravel, with some boulders, sand, and silt; there are many gravel bars. Floodplain connectivity is fragmented by development, and levees protect the City of Cle Elum and highways. This area contains valuable juvenile rearing habitat. Habitat scoring detail is available on Table D-9.

**Flow**

Gauge:Yes The minimum of monthly mean flows in this reach is 543 cfs in October and the peak is 3,455 cfs in July. Minimum flow is 33 percent of the average. This reach has a regulated hydrograph. Flow scoring detail is available on Table D-10.

**3904 Upper Yakima River (Reach 4)**

(Cle Elum R to Easton Dam)

Fish	Habitat	Flow
2	3	2

“The instream flow objectives in the Easton reach are to increase spawning and rearing habitat and improve outmigration conditions. These objectives can be met by adding flow during the fall and winter and adding a spring pulse. Increasing base

flows to 220 cfs in September and October in dry years and to 250 cfs during the rest of the year would benefit spring Chinook and steelhead, which spawn and rear in the Easton reach. Once coho are firmly reestablished in the upper Yakima River Basin, this species would also benefit from increased base flows, especially if increasing base flows reconnects side-channel habitat.

"Side-channel habitat would provide access to more variable habitat conditions, accommodating coho spawning needs more readily and providing low-velocity habitat for rearing juveniles of all salmonid species in the Yakima River Basin. Adult sockeye salmon, once reestablished, would migrate through the Easton reach on their way to upper-basin lake spawning and rearing habitat. Sockeye would benefit from increased September base flows as they migrate upstream from late June through September.

"Adding one pulse flow (1,000 cfs peak) in early April and an additional pulse in drought years in early May would benefit all salmonid outmigrants in the Yakima River Basin, especially sockeye, once reestablished. Sockeye have the most compressed outmigration, likely to occur in April based on mid- and upper-Columbia River transponder tag data for Wenatchee and Okanogan sockeye populations. Spring flows would be augmented occasionally for channel maintenance (every five years for riparian recruitment and bank-full flows during wet years) to improve habitat conditions."

### **Fish Status/Utilization**

Upper Yakima River Reach 4 fish utilization is rated as 'average.' The same stocks in Reach 2 and 3 are found in Reach 4. Juvenile bull trout use this reach for rearing and juvenile and adult sockeye utilize the reach for rearing and migration. In contrast, Upper Yakima River spring Chinook, Upper Yakima Summer Steelhead, and coho use the reach for all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

### **Habitat**

The Cle Elum River to Easton Dam (RM 185.6 to 202.5) reach is considered to be a high quality area for spawning and rearing, characterized by numerous side channels, complex structures in the channel, and good riparian vegetation. There is some development within the floodplain in this reach. Habitat scoring detail is available on Table D-9.

### **Flow**

Gauge: Yes The minimum of monthly mean flows in this reach is 233 cfs in October and the peak is 703 cfs in May. Minimum flow is 50 percent of the average. This reach has a regulated hydrograph. Flow scoring detail is available on Table D-10.

## 3905 Upper Yakima River (Reach 5)

(Easton Dam to Keechelus Dam)

Fish	Habitat	Flow
2	3	3

"The instream flow objective for the Lake Easton to Keechelus Dam reach is to improve fish-rearing conditions. Currently, flows are too high from July through early September when juvenile Chinook and steelhead (and potentially coho if reestablished) are rearing in this reach. Juvenile salmon seek protection against high-velocity flows to avoid being pushed downstream into less desirable habitat and minimize energy expenditures. High summer flows reduce the amount of suitable rearing habitat for these same species as a result of high water velocities. The negative effects on rearing juvenile salmonids from high summer flow conditions in this reach occur during all water year types but are most significant in wet years. Flows in summer during a wet year such as 2002 average about 1,000 cfs.

"During winter, flows are lower than desired by fish biologists, and flow pulses are absent in the spring due to runoff being captured by Keechelus Reservoir. Lower flows reduce available rearing and overwintering habitat throughout the fall and winter, and into early spring in dry years. Flow pulses in spring are needed to mimic natural conditions and support juvenile outmigration. Increasing base flows should increase available juvenile rearing and overwintering habitat in the Keechelus Dam to Lake Easton reach.

"An early April flow pulse would benefit spring Chinook and steelhead juveniles and smolts moving down into the lower basin to rear or outmigrate as smolts. Once reestablished in the upper Yakima River Basin, coho and sockeye would also benefit from increased base flows and spring pulses. During dry years, an additional pulse in early May would further benefit spring Chinook, steelhead, and coho rearing juveniles and outmigrants. (Sockeye smolts likely would already have outmigrated by this time.) Additionally, increased base flows year-round, as well as spring pulses, would benefit all anadromous salmonids - spring Chinook, steelhead, coho, and sockeye - returning to the upper Yakima River Basin to spawn. Increased base flows could also increase available spawning habitat for both spring spawners (steelhead) and fall spawners (spring Chinook and coho)."

## Fish Status/Utilization

The same stocks in reaches 2-4 utilize upper Yakima River Reach 5. Coho, Upper Yakima Summer Steelhead, and Upper Yakima River Spring Chinook use Reach 5 for spawning, rearing, and migration. Bull trout use the reach for juvenile rearing and sockeye for juvenile rearing and adult migration. This fish utilization in Upper Yakima River Reach 5 leads to an ‘average’ rating.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

The Easton to Keechelus Dam (RM 202.5 to 214.5) reach is characterized by numerous side channels, logjams, and braided channels, and is considered to be high quality spawning and rearing habitat with little influence from development. The channel has an excellent riparian corridor, with a lot of complex in-channel structure, and has excellent floodplain function. Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 95 cfs in November and the peak is 922 cfs in July. Minimum flow is 28 percent of the average. This reach has a regulated hydrograph. Flow scoring detail is available on Table D-10.

## 3906 Wenas Creek

(Mouth to Wenas Dam)

Fish	Habitat	Flow
1	1	1

## Fish Status/Utilization

Wenas Creek is a primary tributary to the upper Yakima River mainstem. Fish utilization for this creek is low. Three stocks are present in Wenas Creek. They are coho, Upper Yakima steelhead, and Upper Yakima River Spring Chinook. These stocks limit their use in the creek to juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

Wenas Creek is a RB tributary to the lower Yakima River, entering at RM 122.4. Floodplain function downstream of the dam (RM 14.7) was altered by the combined effects of channelization, gravel mining from bars in the channel, and unrestricted livestock access to the channel. In addition, some historic floodplain side channels are filled and graded, and converted to agriculture.

A control structure at RM 12 diverts the stream into two channels to facilitate irrigation withdrawals. These channels reconnect six miles downstream. Summertime irrigation withdrawals from the creek and the channels remove all

surface water from RM 9-14. Flows downstream of RM 9 are intermittent, and only minimal where present. These low-flow conditions persist into the winter as Wenas Reservoir is refilled.

Bank sloughing is common in the grazed areas downstream of RM 9 and riparian vegetation is virtually nonexistent. The streambed consists of mud and silt.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes Gauge data are only available for April through December 1999. During that period, the lowest monthly flow in this reach was 2.5 cfs in July, and the peak was 104 cfs in April. Flow scoring detail is available on Table D-10.

### 3907 Burbank Creek

(Mouth to river mile 1.9)

Fish	Habitat	Flow
1	1	2

### Fish Status/Utilization

Burbank Creek, a tributary to the upper Yakima River mainstem, also has a low fish utilization rating. Coho, Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook utilize the creek for juvenile rearing only. Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Burbank Creek is a LB tributary to the Yakima River that enters at RM 130.0. It is small stream that drains a vast shrub steppe basin. Fish can access the lower reaches where juvenile coho and steelhead rearing are documented. Very little riparian or floodplain habitat information is available as most of the stream drainage is in private ownership with limited access. The source of flow is exclusively springs. Habitat scoring detail is available on Table D-9.

### Flow

Gauge:No An NHD+ estimated 2 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### Kittitas Valley tributaries – The Wilson/Cherry Complex

The Wilson/Cherry watershed drains an area of 407.8 mi<sup>2</sup> including most of the Kittitas Valley agricultural area. For this evaluation, the Wilson/Cherry complex comprises Wilson, Cherry, Parke, Cooke, Caribou, Naneum, Coleman, Schnebly, Mercer, and Whiskey Creeks, along with Reecer, and Currier Creeks. All streams in this watershed are heavily diverted on the valley floor, and are channelized into an

intricate drainage and irrigation system that bears little resemblance to the historic drainage pattern. Most reaches are straight, high-velocity chutes with few pools, no LWD, and poor riparian vegetation. Floodplain connectivity is fragmented and dysfunctional. Many of the channels are deep and incised and dredged to serve as agricultural drains. The lower reach instream flows are now artificially high during the summer and early fall because of irrigation return flows. Gravel quality and size distribution is good upstream of the Kittitas Valley floor, but in the lower reaches irrigation operations deliver high levels of fine sediment to the channels. Urban runoff from Ellensburg and Kittitas is discharged directly into Wilson Creek and its tributaries. Grazing, channelization, and other agricultural practices impact the riparian zones in the valley reaches. Of the many creeks in this complex, only Cherry and Naneum have gauge data sufficient for use in flow scoring.

### 3908 Wilson Creek

(Mouth to upper confluence with Naneum Creek)

Fish	Habitat	Flow
1	1	2

#### Fish Status/Utilization

Wilson Creek is part of the Wilson Creek Complex. Anadromous fish have not been able to utilize this watershed as widely as they historically did. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Wilson Creek enters the LB of the Yakima River at RM 147.0. Wilson Creek and its three man-made branches pass through the heart of Ellensburg, often underground in culverts. Fish passage is impaired by these long culverts, although adult salmonids have been observed upstream.

Habitat scoring detail is available on Table D-9.

#### Flow

Gauge: No An NHD+ estimated 116 cfs Mean Annual Flow was used to score this reach. Twenty-three flow gauge data points ranging from 1 to 70 cfs (and excluding June-through-October measurements) from 1957-1960 were not used for scoring. Flow scoring detail is available on Table D-10.

## 3909 Cherry Creek

(Mouth to Parke Creek/Cooke Creek confluence)

Fish	Habitat	Flow
1	1	3

### Fish Status/Utilization

Cherry Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho. Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Cherry Creek is a tributary to Wilson Creek. Wilson and Cherry creeks converge approximately 0.5 miles upstream of the Wilson Creek confluence with the Yakima River. In 2011, local conservation efforts removed the lowest barriers on Cherry Creek. Cherry Creek and its tributaries [Caribou, Cooke, Parke, and Badger (Wipple Wasteway)] are used as irrigation delivery systems, and were rerouted, channelized, and dredged for that purpose. Riparian values vary from poor as the stream flows through croplands to fair where riparian is dominated by thick willow patches. The riparian buffers are narrow, and much of the drainage is disconnected from its floodplain because of channelization and adjacent land use. Woody debris is almost non-existent.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes Stream flow in lower Cherry Creek is dominated by irrigation return flow from the eastern side of Kittitas Valley. The minimum of monthly mean flows in this reach is 85 cfs in November and the peak is 362 cfs in May. Minimum flow is 45 percent of the average. Gauge data show two peaks for this reach in May and Sep, with a sharp decline between June and July. Cherry Creek is one of two gauged creeks in the Wilson/Cherry complex, and overall flow volume at the gauge pushed the flow score to 'good' in relation to other Yakima Basin stream reaches.

Flow scoring detail is available on Table D-10.

### 3910 Parke Creek

(Mouth to Mundy Road near East Kittitas)

Fish	Habitat	Flow
1	1	1

#### Fish Status/Utilization

Parke Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho. Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Parke Creek is a tributary to Caribou Creek, which in turn flows into Cherry Creek, then Wilson Creek. As in the other eastern Kittitas Valley drainages, fish passage remains a problem due to irrigation weirs, perched culverts, and unscreened diversions. The stream channel lacks meanders and is disconnected from the floodplain in most areas within the Kittitas Valley floor. Poor riparian and floodplain function reflect the degree of stream modification in the drainage.

Habitat scoring detail is available on Table D-9.

#### Flow

Gauge:No An NHD+ estimated 17 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### 3911 Cooke Creek

(Mouth upstream to KRD<sup>8</sup> North Branch Canal)

Fish	Habitat	Flow
1	1	1

#### Fish Status/Utilization

Cooke Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

<sup>8</sup> Kittitas Reclamation District

## Habitat

Cooke Creek was formerly a direct tributary to the Yakima River, but the modified stream channel now flows into lower Cherry Creek. As in the other eastern Kittitas Valley drainages, fish passage remains a problem due to irrigation weirs, perched culverts, and unscreened diversions. The stream channel lacks meanders and is disconnected from the floodplain in most areas within the Kittitas Valley floor. A few riparian areas have clumps of shrubby willows and reed canary grass.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:No An NHD+ estimated 49 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## 3912 Caribou Creek

(Mouth to KRD North Branch Canal)

Fish	Habitat	Flow
1	1	1

## Fish Status/Utilization

Caribou Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

Caribou Creek is tributary to Cherry Creek. Fish passage is open for 0.7 miles into the Caribou Creek drainage, which crosses the valley and has headwaters in the Colockum Wildlife area. Most of the riparian and floodplain conditions of Wilson/Cherry complex drainages apply to the Caribou Creek watershed.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:No An NHD+ estimated 14 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## 3913 Naneum Creek

(Mouth to gauge near Naneum Road)

Fish	Habitat	Flow
1	1	2

### Fish Status/Utilization

Naneum Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Naneum Creek is a LB tributary to Wilson Creek. The headwaters originate from land that is in public ownership. There is a high presence of fine sediments due to ground disturbances and surface erosion in the mainstem Naneum within the forest zone. Much of the mainstem of Naneum Creek and its major tributaries lack sufficient amounts of LWD in the channel because there are no trees along the banks for recruitment. This causes a homogenous channel structure that is disconnected from the floodplain and lacks suitably complex fish habitat. Restoration of woody riparian vegetation in the agricultural lands on the valley floor is inhibited by active spraying to control weeds and by massive stands of reed canary grass in many riparian areas that suppress and compete with native woody vegetation. Fish passage remains a problem in most of the creek north of I-90.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge: Yes The USGS maintained a flow gage station for 20 years (1957-1978) in the Naneum Creek Canyon, making Naneum one of two creeks in the Wilson/Cherry complex having sufficient stream gauge data for flow scoring. This gauge station record shows tributary flow variation considered typical of the numerous creeks feeding the eastern Kittitas Valley.

The minimum of monthly mean flows in this reach is 18 cfs in October and the peak is 197 cfs in May. Minimum flow is 31 percent of the average. Maximum flows reached 350 cfs in June 1974, and the lowest recorded flow during the gauged era was 7.6 cfs in August 1977. Even with these low flows, Naneum scores “fair” for flow condition in relation to other Yakima Basin streams.

Flow scoring detail is available on Table D-10.

### 3914 Coleman Creek

(Mouth to KRD North Branch Canal)

Fish	Habitat	Flow
1	1	1

#### Fish Status/Utilization

Coleman Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Coleman Creek flows into lower Naneum Creek. Coleman is used as conveyance drainage for irrigation water delivery and for return flows. Fish passage is restored in lower Coleman Creek but remains a problem in reaches near I-90. The stream channel lacks meanders and is disconnected from its floodplain. A few riparian areas have clumps of shrubby willows and reed canary grass.

Habitat scoring detail is available on Table D-9.

#### Flow

No flow information is available for Coleman Creek, so 'poor' conditions are assumed. Flow scoring detail is available on Table D-10.

### 3915 Schnebly Creek

(Mouth to KRD North Branch Canal)

Fish	Habitat	Flow
1	1	1

#### Fish Status/Utilization

Schnebly Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

There is no habitat information available for Schnebly Creek. Habitat scoring detail is available on Table D-9.

## Flow

Gauge:No An NHD+ estimated 7 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### 3916 Mercer Creek

(Mouth to KRD North Branch Canal)

Fish	Habitat	Flow
1	1	2

#### Fish Status/Utilization

Mercer Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

There is no habitat information available for Mercer Creek. Habitat scoring detail is available on Table D-9.

## Flow

Gauge:No An NHD+ estimated 18 cfs Mean Annual Flow was used to score this reach. Estimated flow in the double-digits boosted the flow condition score for this reach to 'fair.' Flow scoring detail is available on Table D-10.

### 3917 Reecer Creek

(Mouth to KRD North Branch Canal)

Fish	Habitat	Flow
1	1	1

#### Fish Status/Utilization

Reecer Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Reecer Creek is a LB tributary to the upper Yakima River, entering at RM 153.7. The floodplain of Reecer Creek is constrained by a levee on the west side of the creek from Dollar Way to I-90. Upstream, the creek is channelized for several miles. There

is perennial stream flow in the headwaters of Reecer Creek, but surface flow is intermittent from the base of the canyon to the Highline Canal during the late summer. Below the Highline Canal, Reecer Creek is used for irrigation delivery and return flows.

There is a lack of LWD throughout most of Reecer Creek. Riparian condition is generally poor, with sporadic narrow patches of mature non-native willow trees. The few pools that are present are in the immediate vicinity of these willow patches.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:No An NHD+ estimated 19 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## 3918 Whiskey Creek

(Mouth to Wilson Creek)

Fish	Habitat	Flow
1	1	1

### Fish Status/Utilization

Whiskey Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Whiskey Creek is a tributary of the Wilson Creek drainage, connected to Wilson Creek on the lower end and both Wilson and Naneum creeks on the upper end. There are several irrigation weirs that remain as upstream fish passage barriers. The stream provides one of the remaining pathways for steelhead around the City of Ellensburg to access the upper Naneum Creek drainage. The lower two miles of floodplain and riparian functions are degraded severely.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:No No flow information is available for this creek. Flow scoring detail is available on Table D-10.

### 3919 Currier Creek

(Mouth to KRD North Branch Canal)

Fish	Habitat	Flow
1	1	1

#### Fish Status/Utilization

Currier Creek is part of the Wilson Creek Complex. Current fish utilization in the complex is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Currier Creek is a large LB tributary of Reecer Creek at about RM 1.5. It is the larger of the two channels at that location because of accumulated irrigation return flows. The stream is perennial and salmonid presence is verified to the KRD Canal. Flows in Currier Creek are likely a mix of irrigation return flows and natural flow, although it is difficult to quantify contributions. Although there is a history of channelization and removal of woody debris, Currier Creek has sufficient flows and riparian cover to provide fair rearing habitat for salmonids upstream to Town Ditch. Currier Creek has a narrow intermittent riparian zone of large willow trees from its confluence with Reecer Creek upstream to the John Wayne Trail. Further upstream the creek flows through pastures and woody riparian patches of willows and hawthorn.

Habitat scoring detail is available on Table D-9.

#### Flow

Gauge:No An NHD+ estimated 11 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### Upper Basin Tributaries

#### 3920 Manastash Creek

(Mouth to NF/SF confluence)

Fish	Habitat	Flow
2	2	1

#### Fish Status/Utilization

Manastash Creek is a primary tributary to the upper Yakima River mainstem. This creek has an 'average' fish utilization rating. Three stocks are present here. Upper

Yakima River spring Chinook, Upper Yakima Summer Steelhead, and coho spawn, rear, and migrate in Manastash Creek.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Manastash Creek is a RB tributary to the lower Yakima River, entering at RM 154.5. The confluence of the north and south forks occurs at RM 8.5. The lower five miles of Manastash Creek flow through fields and pastures. From the mouth to Barnes Road (RM 1.25), the channel is naturally incised and fish passage across the delta fan is impaired during low flow periods. From Barnes Road upstream to the diversion at RM 4.2, the channel is channelized and incised, with no LWD or pools. Vegetation and streambank cover are favorable to salmonid production in nearly all areas of the mainstem, with shade present in most areas.

The creek contains excellent spawning and rearing habitat for anadromous salmonids, but instream flows are impacted severely by irrigation diversions during the irrigation season. Typically, there is no surface flow from mid-July through October from approximately RM 1.5 to just below the diversion at RM 4.2.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 15 cfs in October and the peak is 236 cfs in May. Minimum flow is 18 percent of the average. Flow scoring detail is available on Table D-10.

## 3921 Dry Creek

(Mouth to KRD North Branch Canal)

Fish	Habitat	Flow
1	1	1

### Fish Status/Utilization

Current fish utilization is low and limited to juvenile rearing by Upper Yakima Summer Steelhead and Upper Yakima River Spring Chinook and all three life cycle stages by coho. Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Dry Creek is a LB tributary to the upper Yakima River, entering at RM 157.6. There are fish passage barriers in lower reaches, and low flow limits fish passage in Upper Dry Creek. Dry Creek is channelized from essentially its confluence with the old river meander to very near the KRD canal crossing. There is a gallery of mature cottonwoods at the confluence of Dry Creek with the historic Yakima side-channel and throughout the side channel. Dry Creek scored 'poor' for all habitat attributes.

## Flow

Gauge:No An NHD+ estimated 11 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## 3922 Taneum Creek

(Mouth to Knudson Diversion)

Fish	Habitat	Flow
2	2	2

## Fish Status/Utilization

Taneum Creek, a tributary to the upper Yakima River mainstem, supports three stocks and has an 'average' fish utilization rating. Upper Yakima River Spring Chinook, Upper Yakima Summer Steelhead, and coho utilize the creek for spawning, rearing, and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

Taneum Creek is a RB tributary to the upper Yakima River, entering at RM 166.1. Taneum Creek watershed has narrow valleys with steep sides. The primary land use adjacent to Taneum Creek is agricultural crop production and forestry. The moderately steep gradient in the lower reaches tends to limit pool frequency. There is significant bank erosion downstream of I-90. Substrate in the moderately steep lower reaches is composed primarily of rubble, however patches of good gravel are numerous.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 7 cfs in September and the peak is 194 cfs in May. Minimum flow is 11 percent of the average. Most of the natural summer flow of Taneum Creek is fully appropriated for irrigation. Recent trust water projects restored significant amounts of flow during the summer as well as during the winter. Flow scoring detail is available on Table D-10.

## 3923 Swauk Creek

(Mouth to Williams Creek ~ RM 11.0)

Fish	Habitat	Flow
2	2	1

### Fish Status/Utilization

Fish utilization for Swauk Creek is rated 'average.' This creek supports four stocks. Upper Yakima River Spring Chinook and bull trout utilization of the reach is limited to juvenile rearing. The remaining two stocks, Upper Yakima Summer Steelhead and coho, express all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

Swauk Creek is a LB tributary to the upper Yakima River, entering at RM 169.9. Swauk Creek is confined naturally from the mouth upstream to Hidden Valley. The lower three miles of the watershed are located in a steep arid canyon. Progressing upstream, willows, alder, and cottonwoods gradually increase until, by RM 8, the stream flows through a conifer forest of increasing density.

Historic road construction and mining resulted in the straightening of most stream reaches, steeper channel gradients, and downstream bank erosion. Culverts are undersized in places, causing debris blockages, fish passage barriers, and localized erosion during peak flows.

The drainage area of Swauk Creek is fairly large and unregulated summer stream flows are low. Recent trust water projects restored six cfs during the summer period and another six cfs during the winter period. Lack of instream flow in lower Swauk Creek during late summer and early fall is considered to be a natural occurrence.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:Yes The minimum of monthly mean flows in Swauk Creek is 6 cfs in September and the peak is 164 cfs in May. Minimum flow is 11 percent of the average. Flow scoring detail is available on Table D-10.

### 3924 First Creek

(Mouth to First Creek Water Users Diversion at RM 2.0)

Fish	Habitat	Flow
1	3	1

#### Fish Status/Utilization

First Creek is a tributary to Swauk Creek. The low fish utilization rating can be attributed to the number of stocks present. Upper Yakima Summer Steelhead is the only stock found in this reach but the stock expresses all three life cycle stages.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

First Creek instream habitat is limited by summer low flows. Irrigation diversions and natural late summer low flows create potential fish passage problems in the lower half mile of the stream. The stream flows out of high elevation rocky basins and has been measured with temperatures in the mid 40 degrees F, even during the late summer period. The stream gradient is steep, and instream habitat consists of LWD piles, sufficient amount of cover pools, riffles, and a few small side channels.

Habitat scoring detail is available on Table D-9.

#### Flow

Gauge:No An NHD+ estimated 13 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### 3925 Williams Creek

(Mouth to road crossing 2.4 miles above Liberty [- RM 4.4])

Fish	Habitat	Flow
1	2	1

#### Fish Status/Utilization

Williams Creek, a tributary to Swauk Creek, supports two stocks, which leads to a low fish utilization rating. Juvenile coho use the creek for rearing whereas Upper Yakima Summer Steelhead use the creek for spawning, rearing, and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Williams Creek flows through the town of Liberty, as well as several nearby small farms. The riparian habitat is extremely modified in the developed areas, but

riparian conditions improve further upstream. Lower Williams Creek is heavily grazed, with little riparian vegetation. Floodplain function is impaired along much of Williams Creek, as a result of channel incision caused by a combination of grazing, mining, and road impacts.

Habitat scoring detail is available on Table D-9.

### Flow

Gauge:No An NHD+ estimated 20 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

## 3926 Teanaway River

(Mouth to forks at ~ RM 11.3)

Fish	Habitat	Flow
2	2	2

### Fish Status/Utilization

Fish utilization is ‘average’ for the four stocks in the Teanaway River, a tributary to the upper Yakima River mainstem. Three stocks, Upper Yakima River Spring Chinook, Upper Yakima summer Steelhead and coho, use the river for spawning, rearing and adult migration whereas bull trout use the river for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

### Habitat

The Teanaway River is a LB tributary to the Yakima, entering at RM 176.1. The lower Teanaway (downstream of the forks) flows through a broad valley consisting mainly of irrigated hayfields, with recent heavy conversion to recreational/residential home sites. The Teanaway River has a high flow variation due to the watershed topography. Lack of LWD reduces the quality and quantity of pool habitat, and thus limits gravel deposition zones, although biologists agree that that substrate condition in the mainstem is fair to good.

The river is disconnected from its floodplain and the floodplain itself is highly altered. These alterations include the draining of ponds and wetlands and the filling of side channels, significant loss of beaver presence in the lower watershed, straightening of the river, and levee construction. Many mature cottonwoods still line the banks, but channel widening and the lack of LWD minimize the shade benefit from the trees in the summer.**Error! Reference source not found.**

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 23 cfs in September and the peak is 932 cfs in May. Minimum flow is 7 percent of the average. Flow scoring detail is available on Table D-10.

### 3927 North Fork Teanaway River

(Mouth to Jack Creek at ~ RM 6.2)

Fish	Habitat	Flow
2	3	2

#### Fish Status/Utilization

North Fork Teanaway River also has an ‘average’ fish utilization rating. The reach supports spawning, rearing, and adult migration life cycle stages for Upper Yakima River Spring Chinook, Upper Yakima Summer Steelhead, and coho. Bull trout utilize the river for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Suitable spawning gravels and gradients for all three species are present in the lower portions of the NF. The upper reaches of the NF provide additional spawning habitat for steelhead and coho. Substrate condition in the NF is rated as fair, with little sedimentation. Instream cover in the form of LWD is lacking in the NF. There is a good mix of pools, runs, and riffles despite the extensive areas of very high erosion risk.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:No An NHD+ estimated 141 cfs Mean Annual Flow was used to score this reach. Flow scoring detail is available on Table D-10.

### 3928 Cle Elum River

(Mouth to Cle Elum Dam)

Fish	Habitat	Flow
2	3	3

“The instream flow objective for the Cle Elum River is to improve fish-rearing conditions. Under present operations, flows are too high during July and August, and low flow and a lack of flow variation from September 10 through March limits access to available side channels when juvenile Chinook and steelhead (and

potentially coho if reestablished) are rearing in this reach. Juvenile salmon seek low-velocity habitat as protection against being pushed out of a reach and to minimize energy expenditures. High summer flows reduce the amount of suitable rearing habitat for these species as a result of high water velocities.

"During the remainder of the year, flows are lower than desired for fish, and flow pulses are absent in the spring. Lower flows result in reduced available rearing and overwintering habitat throughout the fall and winter and extending through early spring. Flow pulses that mimic natural conditions in spring are needed to support juvenile outmigration. Increasing base flows should increase available juvenile rearing and overwintering habitat in this reach. An early April flow pulse would benefit spring Chinook and steelhead juveniles and smolts that are moving down into the lower basin to rear or outmigrate as smolts.

"Once reestablished in the upper Yakima River Basin, coho and sockeye would also benefit from these flow changes. Increased base flows year-round, as well as a spring pulse, would benefit all anadromous salmonids - spring Chinook, steelhead, coho, and sockeye - returning to the upper Yakima River Basin to spawn. Integrated with floodplain restoration efforts in this reach, increased base flows and spring pulses can have additive benefits to Yakima River Basin salmonid species."

### **Fish Status/Utilization**

The Cle Elum River supports five stocks but has an 'average' fish utilization rating. Upper Yakima River Spring Chinook, Upper Yakima Summer Steelhead and coho express all three life cycle stages in this reach. Bull trout utilize the reach for juvenile rearing where as sockeye use the Cle Elum River for juvenile rearing and adult migration.

Fish Status/Utilization scoring detail is available on Table D-8.

### **Habitat**

The Cle Elum River is a LB bank tributary to the upper Yakima River, entering at RM 185.6. The Cle Elum River downstream of Cle Elum Dam is characterized by a large channel with several large side channel complexes that do not become connected to the mainstem unless flows exceed 500 cfs. The numerous side channels along the river below the dam are excellent rearing habitat for fry and parr in the spring and summer. Substrate condition in this reach is fair to good, with little sedimentation. Riparian condition here is good, including good forest buffer areas.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 215 cfs in October and the peak is 2,918 cfs in July. Minimum flow is 23 percent of the average. The natural hydrology of the Cle Elum River is significantly altered by water storage for flood control and irrigation water delivery. Flow scoring detail is available on Table D-10.

## 3929 Big Creek

(Mouth to removed dam site at ~ RM 2.9)

Fish	Habitat	Flow
1	2	1

## Fish Status/Utilization

Fish utilization rating for Big Creek, a tributary to the upper Yakima River mainstem, is low. This can be attributed to the limited number of stocks found in Big Creek. Coho and Upper Yakima Summer Steelhead utilize the creek for all three life cycle stages whereas Upper Yakima River Spring Chinook use is limited to juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

## Habitat

Big Creek is a RB tributary to the Yakima River, entering at RM 195.8. This reach is channelized, with associated channel instability and bedload deposition in the lowermost 0.25 mile. Sediment recruitment is likely caused by channel and bank instability upstream and downstream of the KRD crossing, possibly associated with the lack of LWD and riparian vegetation through this area. Habitat complexity is limited in the lower reach, which is now almost exclusively a single channel providing pocket-water habitat.

Habitat scoring detail is available on Table D-9.

## Flow

Gauge:Yes The minimum of monthly mean flows in this reach is 7 cfs in September and the peak is 169 cfs in May. Minimum flow is 15 percent of the average. Flow scoring detail is available on Table D-10.

### 3939 Little Creek

(Mouth to KRD Canal at ~ RM 1.6)

Fish	Habitat	Flow
1	2	2

#### Fish Status/Utilization

Fish utilization in Little Creek is low. Coho and Upper Yakima Summer steelhead use the creek for spawning, rearing, and adult migration and Upper Yakima River Spring Chinook utilize Little Creek for juvenile rearing.

Fish Status/Utilization scoring detail is available on Table D-8.

#### Habitat

Little Creek is a RB tributary to the Yakima River, entering at RM 194.6. Lack of LWD is a significant concern in the Little Creek Watershed. The channel upstream from the Nelson Siding Road appears to be unstable. There is extensive bedload movement and accretion during peak flows. Habitat scoring detail is available on Table D-9.

#### Flow

Gauge:No An NHD+ estimated 30 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 D-10.

## 5. Scoring Sheets

Table D-8 Fish Scoring Sheet

Code	Reach Name	Reach Score & Bin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3701	Lower Yakima River (Reach 1)	422	35	33	37	43	42	32	30	22	39	37	37	35
3702	Lower Yakima River (Reach 2)	422	35	33	37	43	42	32	30	22	39	37	37	35
3703	Lower Yakima River (Reach 3)	422	35	33	37	43	42	32	30	22	39	37	37	35
3704	Lower Yakima River (Reach 4)	438	37	35	39	45	44	38	33	25	36	36	36	34
3705	Lower Yakima River (Reach 5)	382	34	32	35	41	40	34	29	22	29	29	29	28
3706	Satus Creek	321	30	28	30	30	30	25	22	20	25	27	27	27
3707	Toppenish Creek	296	28	26	28	28	27	22	19	17	24	26	26	25
3708	Simcoe Creek	131	15	13	13	13	13	8	5	5	10	12	12	12
3709	Ahtanum Creek	316	30	28	29	29	29	24	21	20	25	27	27	27
3710	North Fork Ahtanum Creek	203	21	19	19	19	19	14	11	11	16	18	18	18
3711	Wide Hollow Creek	244	24	22	23	23	23	18	15	14	19	21	21	21
3801	Naches River (Reach 1)	343	31	29	30	34	33	28	25	20	27	29	29	28
3802	Naches River (Reach 2)	275	25	23	23	27	27	22	21	17	22	24	22	22
3803	Cowiche Creek	220	22	20	21	21	21	16	13	12	17	19	19	19
3804	South Fork Cowiche Creek	131	15	13	13	13	13	8	5	5	10	12	12	12
3805	Tieton River	241	24	22	22	22	22	17	16	14	19	21	21	21
3806	Rattlesnake Creek	259	24	22	22	22	22	20	19	17	22	24	24	21
3807	Gold Creek	233	22	20	20	20	20	18	15	15	20	22	22	19
3808	Little Naches River	259	24	22	22	22	22	20	19	17	22	24	24	21
3809	Bumping River	280	27	25	22	22	22	20	19	20	25	27	27	24
3901	Upper Yakima River (Reach 1)	303	28	26	29	31	30	27	22	19	23	23	23	22
3902	Upper Yakima River (Reach 2)	221	22	20	22	22	22	19	16	14	16	16	16	16
3903	Upper Yakima River (Reach 3)	221	22	20	22	22	22	19	16	14	16	16	16	16
3904	Upper Yakima River (Reach 4)	221	22	20	22	22	22	19	16	14	16	16	16	16
3905	Upper Yakima River (Reach 5)	221	22	20	22	22	22	19	16	14	16	16	16	16

Code	Reach Name	Reach Score & Bin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3906	Wenas Creek	84	7	7	7	7	7	7	7	7	7	7	7	7
3907	Burbank Creek	84	7	7	7	7	7	7	7	7	7	7	7	7
3908	Wilson Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3909	Cherry Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3910	Parke Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3911	Cooke Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3912	Caribou Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3913	Naneum Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3914	Coleman Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3915	Schnebly Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3916	Mercer Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3917	Reecer Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3918	Whiskey Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3919	Currier Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3920	Manastash Creek	169	19	17	17	17	17	12	11	9	11	13	13	13
3921	Dry Creek	110	11	9	9	9	9	7	7	7	9	11	11	11
3922	Taneum Creek	169	19	17	17	17	17	12	11	9	11	13	13	13
3923	Swauk Creek	179	20	18	18	18	18	13	10	10	12	14	14	14
3924	First Creek	69	9	9	9	9	9	6	3	3	3	3	3	3
3925	Williams Creek	93	11	11	11	11	11	8	5	5	5	5	5	5
3926	Teanaway River	241	25	23	23	23	23	18	17	15	17	19	19	19
3927	North Fork Teanaway River	241	25	23	23	23	23	18	17	15	17	19	19	19
3928	Cle Elum River	221	22	20	22	22	22	19	16	14	16	16	16	16
3929	Big Creek	143	17	15	15	15	15	10	7	7	9	11	11	11
3930	Little Creek	143	17	15	15	15	15	10	7	7	9	11	11	11

Note: Reach names do NOT link with workbook tabs (apologies).

**Table D-8 Fish Scoring Sheet - continued**

WRIA Subtotals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Monthly Grand Total (WRIA 37)</b>	324	302	327	357	351	279	245	200	301	307	307	297
<b>Monthly Grand Total (WRIA 38)</b>	214	196	195	203	202	169	152	137	184	202	200	187
<b>Monthly Grand Total (WRIA 39)</b>	457	405	418	420	419	334	295	274	328	368	368	367
<b>Monthly Grand Total (Yakima Basin)</b>	995	903	940	980	972	782	692	611	813	877	875	851

SaSI Stocks in the Yakima Basin	WRI A	SaSI Stock Rating	Weight Factor**
American River Spring Chinook - 1760	38	Depressed	2
Upper Yakima River Spring Chinook - 1747	39	Depressed	2
Naches Spring Chinook - 1752	38	Depressed	2
Yakima River Bright Fall Chinook - 1728	37	Healthy	1
Marion Drain Fall Chinook - 1744	37	Healthy	1
Naches Summer Steelhead - 6892	38	Unknown	2
Satus Creek Summer Steelhead - 6888	37	Unknown	2
Toppenish Creek Summer Steelhead - 6890	37	Unknown	2
Upper Yakima Summer Steelhead - 6894	39	Unknown	2
Coho - 3805	All	Unknown	2
Sockeye - SaSI stock not assigned	39	Unknown	2

SaSI Stocks in the Yakima Basin	WRIA	SaSI Stock Rating	Weight Factor**
South Fork Tieton Bull Trout - 8459	38	Healthy	2
Indian Creek Bull Trout - 8462	38	Depressed	
North Fork Tieton River Bull Trout - 8465	38	Unknown	
Yakima River Bull Trout - 8468	37,39	Critical	
Ahtanum Creek Bull Trout - 8480	37	Critical	
Rattlesnake Creek Bull Trout - 8495	38	Depressed	
American River Bull Trout - 8498	38	Depressed	
Crow Creek Bull Trout - 8501	38	Critical	
Deep Creek Bull Trout - 8504	38	Depressed	
North Fork Teanaway River Bull Tr - 8516	39	Critical	
Cle Elum/Waptus Lakes Bull Trout - 8528	39	Unknown	
Box Canyon Creek Bull Trout - 8543	39	Critical	
Kachess River Bull Trout - 8547	39	Critical	
Gold Creek Bull Trout - 8552	39	Critical	

**Table D-8 Fish Scoring Sheet - continued**

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
Weighting Factor for Spatial Structure and Diversity of Fish Stocks	Weight Factor
Assign additional weight to reaches within Interior Columbia TRT-designated Major or Minor Spawning Areas (MaSAs or MiSAs)? (yes=1; no=0)	0

**Table D-9 Habitat Scoring Sheet**

Reach Code	Reach name	Reach Score & Bin	Off Channel Habitat (OCHs)	Flood-plain Connectivity	Riparian Condition	Spawning Suitability	Rearing Suitability	Passage Condition
3701	Lower Yakima River (Reach 1)	13	2	3	2	1	2	3
3702	Lower Yakima River (Reach 2)	11	2	2	2	1	2	2
3703	Lower Yakima River (Reach 3)	14	2	2	2	2	3	3
3704	Lower Yakima River (Reach 4)	16	3	3	2	2	3	3
3705	Lower Yakima River (Reach 5)	16	3	2	2	3	3	3
3706	Satus Creek	13	2	2	2	3	2	2
3707	Toppenish Creek	12	1	2	2	3	2	2
3708	Simcoe Creek	10	1	1	2	2	2	2
3709	Ahtanum Creek	12	2	2	2	2	2	2
3710	North Fork Ahtanum Creek	14	3	2	2	2	3	2
3711	Wide Hollow Creek	9	1	1	2	2	2	1
3801	Naches River (Reach 1)	14	2	2	2	3	3	2
3802	Naches River (Reach 2)	16	2	2	3	3	3	3
3803	Cowiche Creek	14	2	2	2	3	3	2
3804	South Fork Cowiche Creek	18	3	3	3	3	3	3
3805	Tieton River	10	1	1	2	1	2	3
3806	Rattlesnake Creek	16	2	3	2	3	3	3
3807	Gold Creek	15	2	2	3	3	3	2
3808	Little Naches River	18	3	3	3	3	3	3
3809	Bumping River	18	3	2	3	3	3	4
3901	Upper Yakima River (Reach 1)	11	1	1	2	2	2	3
3902	Upper Yakima River (Reach 2)	15	2	2	2	3	3	3
3903	Upper Yakima River (Reach 3)	16	2	2	3	3	3	3
3904	Upper Yakima River (Reach 4)	19	3	3	3	3	3	4
3905	Upper Yakima River (Reach 5)	18	3	3	3	3	3	3
3906	Wenas Creek	6	1	1	1	1	1	1
3907	Burbank Creek	9	1	2	1	1	2	2

Reach Code	Reach name	Reach Score & Bin	Off Channel Habitat (OCHs)	Flood-plain Connectivity	Riparian Condition	Spawning Suitability	Rearing Suitability	Passage Condition
3908	Wilson Creek	7	1	1	1	1	2	1
3909	Cherry Creek	8	1	1	2	1	2	1
3910	Park Creek	7	1	1	1	1	2	1
3911	Cooke Creek	7	1	1	1	1	2	1
3912	Caribou Creek	7	1	1	1	1	2	1
3913	Naneum Creek	6	1	1	1	1	1	1
3914	Coleman Creek	7	1	1	1	1	2	1
3915	Schnebly Creek	7	1	1	1	1	2	1
3916	Mercer Creek	7	1	1	1	1	2	1
3917	Reecer Creek	9	1	1	1	2	2	2
3918	Whiskey Creek	6	1	1	1	1	1	1
3919	Currier Creek	9	1	1	1	2	2	2
3920	Manastash Creek	12	2	2	2	2	3	1
3921	Dry Creek	6	1	1	1	1	1	1
3922	Taneum Creek	12	2	2	2	2	2	2
3923	Swauk Creek	14	2	2	2	2	3	3
3924	First Creek	16	3	2	3	2	3	3
3925	Williams Creek	13	2	2	2	2	3	2
3926	Teaway River	15	2	2	2	3	3	3
3927	North Fork Teaway River	17	3	2	3	3	3	3
3928	Cle Elum River	18	3	2	3	4	3	3
3929	Big Creek	14	2	2	2	3	3	2
3930	Little Creek	14	2	2	3	2	3	2





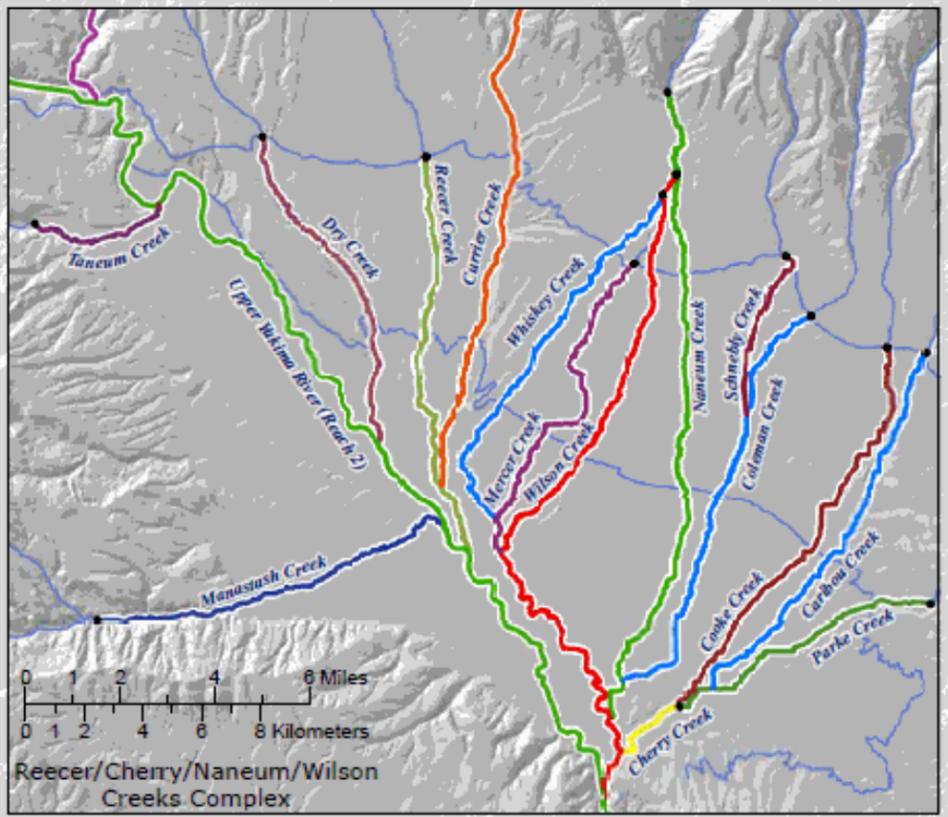
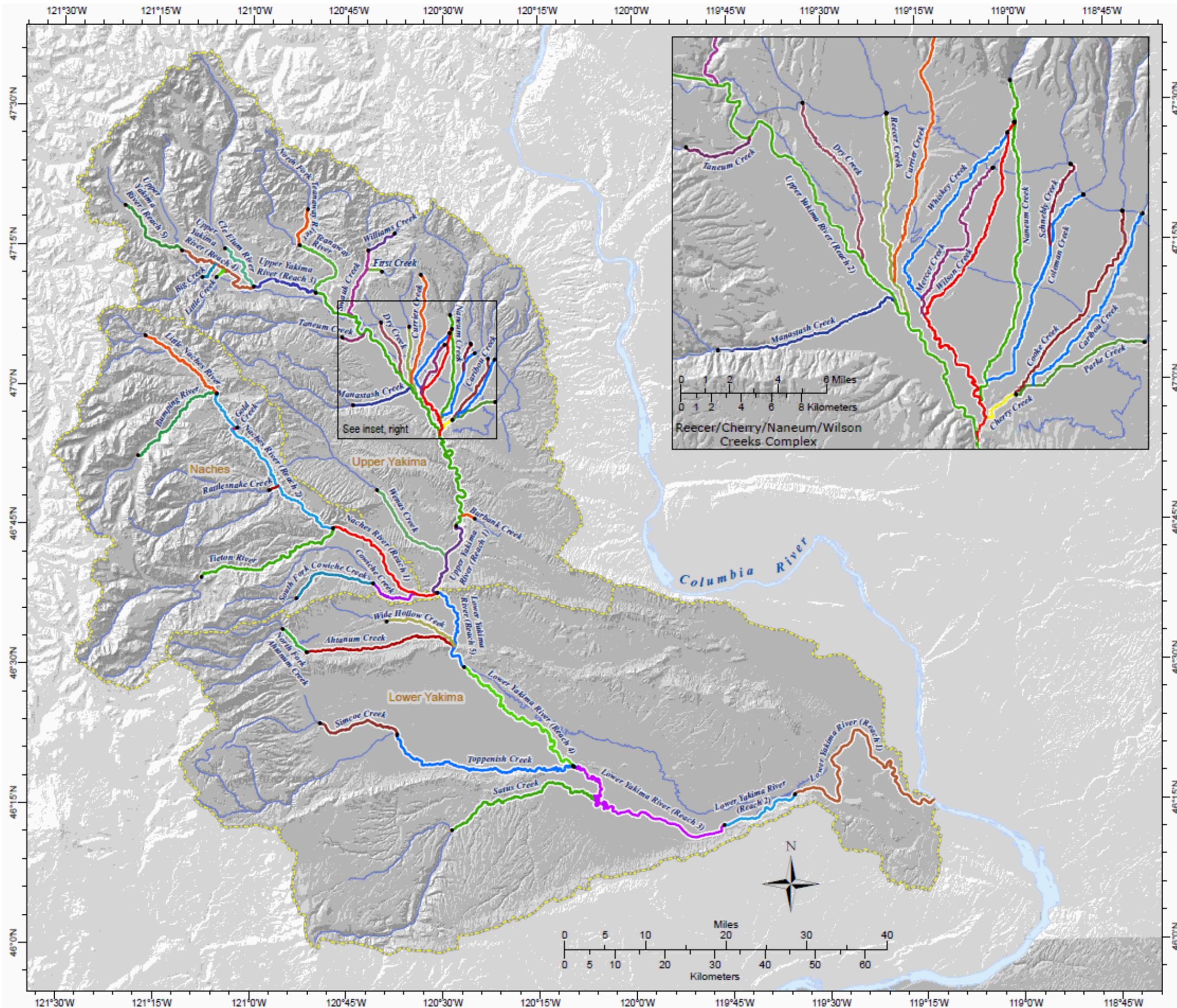
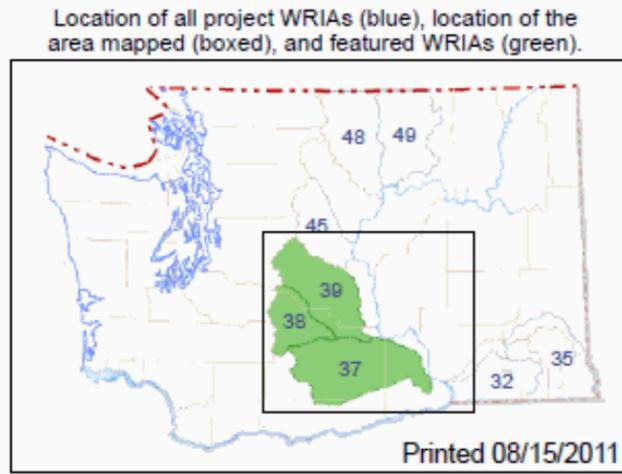


Figure D-1 Assessed Stream Reaches



**Yakima River Basin  
WRIs 37, 38, and 39  
Assessed Stream Reaches  
colored for visual reference**

- — Assessed Stream Reach upper extents
- Continuation of Assessed Streams to Headwaters



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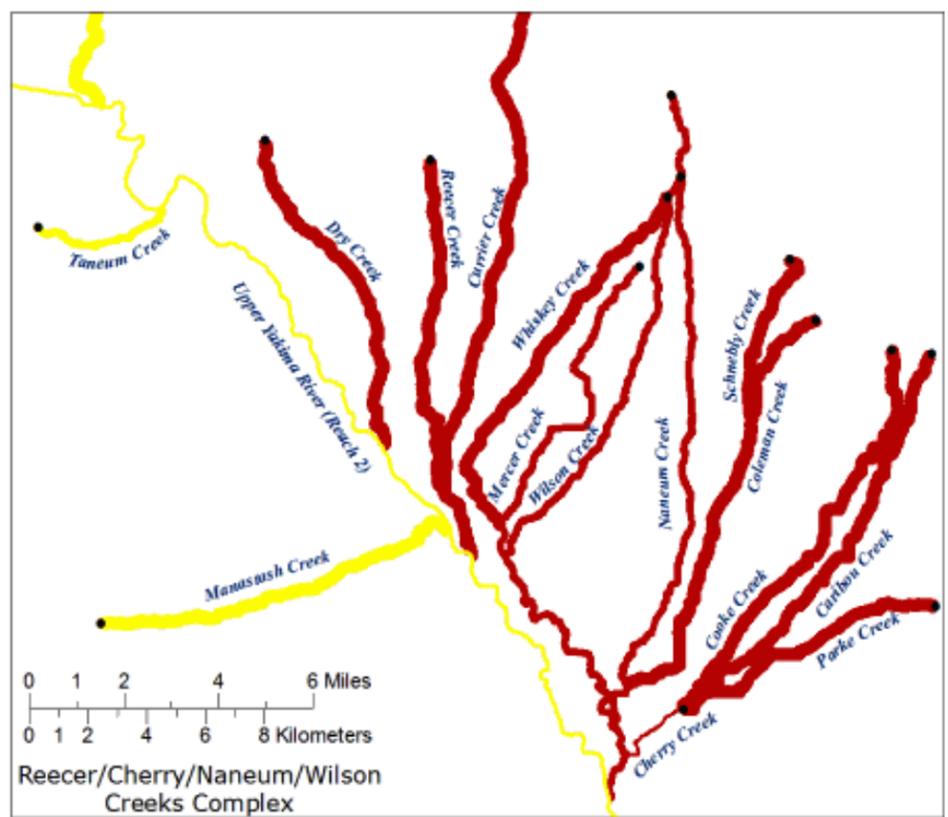
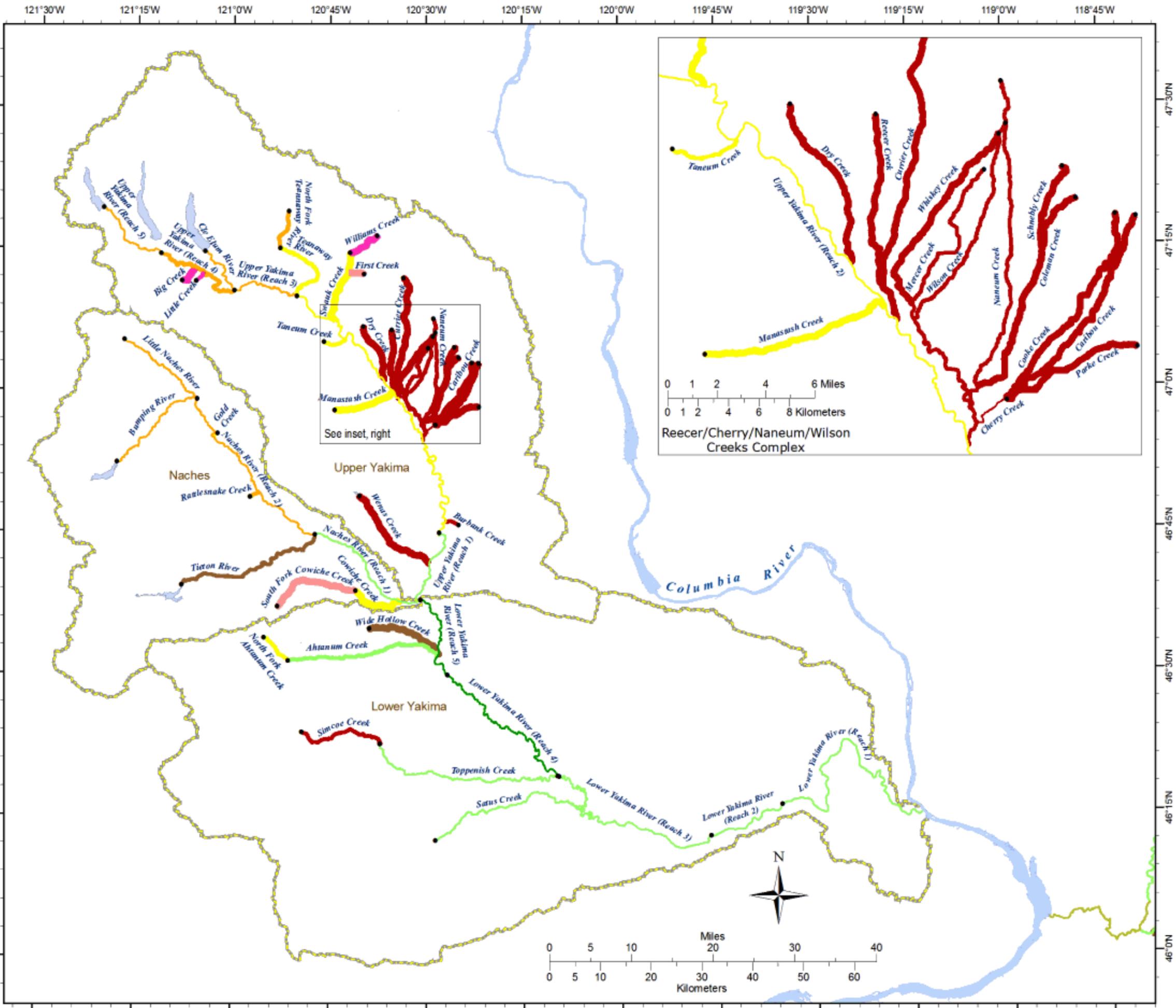


Figure D-2 Combined Prioritization Scores Fish, Habitat, & Flow



**Yakima River Basin  
WRIAs 37, 38, and 39  
Combined Prioritization Scores  
for Fish, Habitat, and Flow**

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

Fish Score			Habitat Score
Low	Avg	High	
			Good
			Fair
			Poor

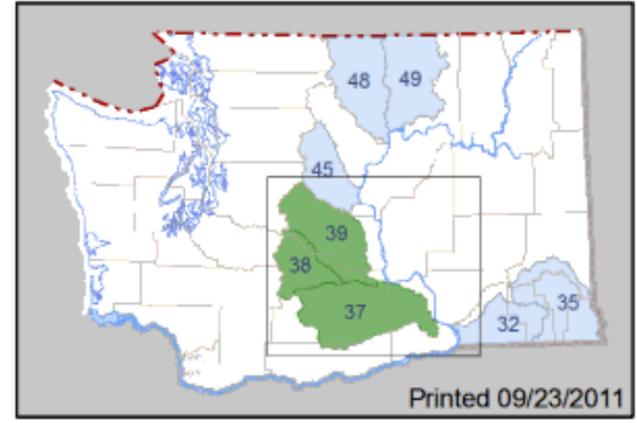
**Flow Condition score  
uses line thickness**

- 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 37, 38, and 39 - Yakima River Basin - Fish, Habitat, and Flow

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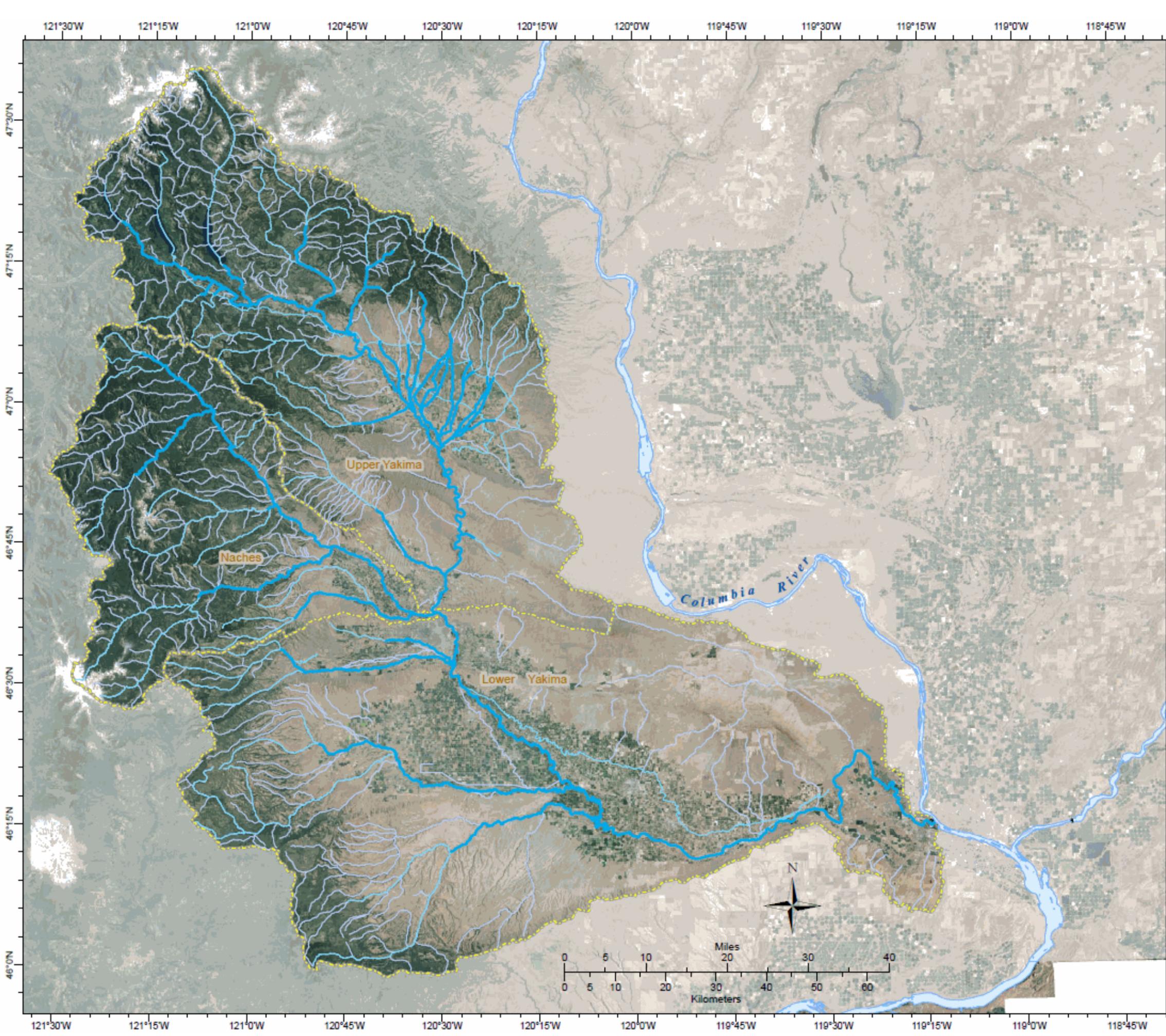
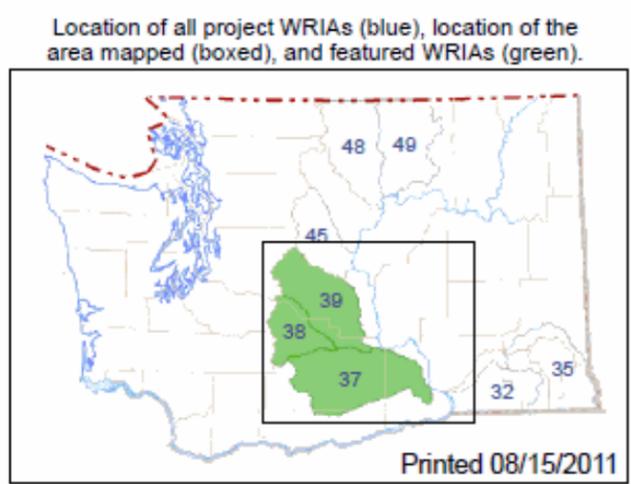


Figure D-3 2001 Statewide 1m Orthophoto



**Yakima River Basin**  
**WRIAs 37, 38, and 39**  
**2009 Statewide 1m Orthophoto**

- Stream Distinctions
-  Assessed Reaches
  -  Headwaters of Assessed Reaches
  -  Other Named Streams
  -  WRIA Boundary



WRIAs 37, 38, and 39 - Yakima River Basin - Orthophoto

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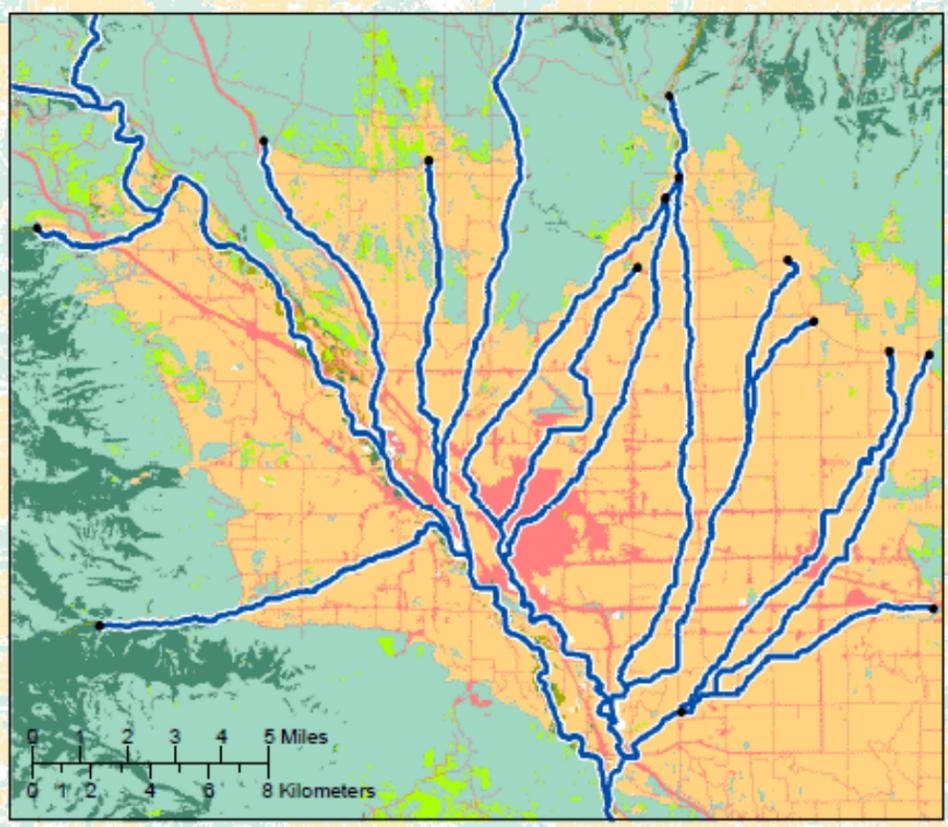
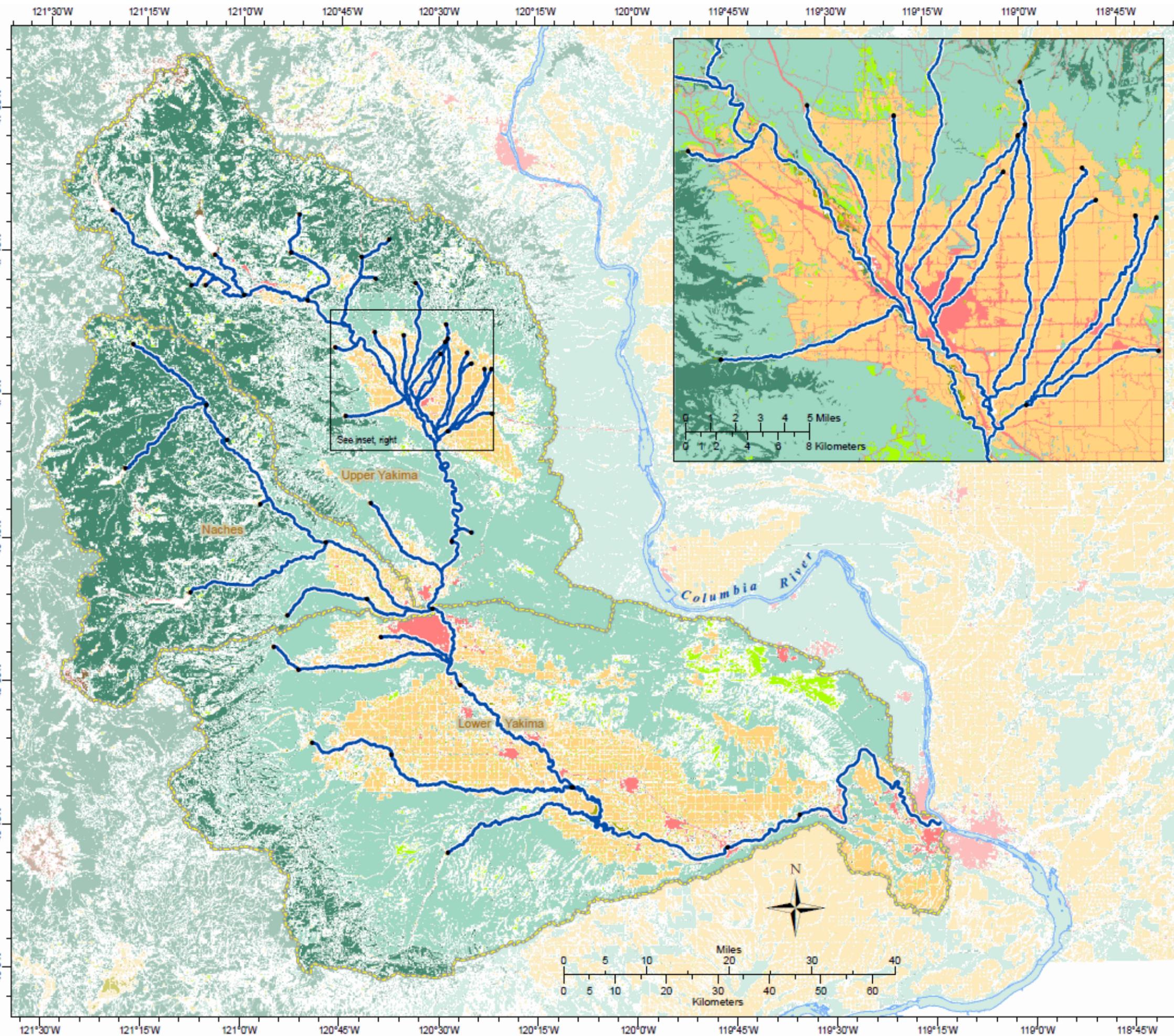


Figure D-4 2001 National Land Cover Database



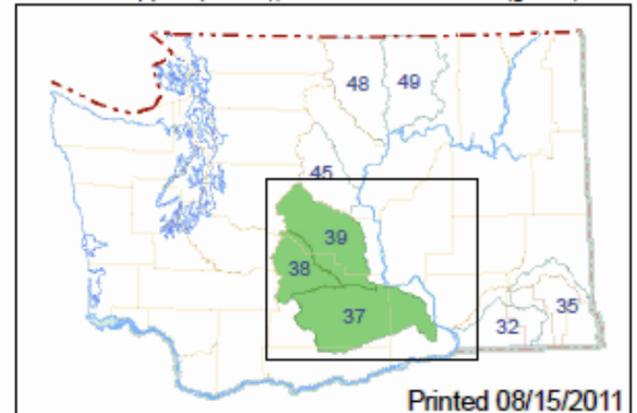
**Yakima River Basin**  
**WRIAs 37, 38, and 39**  
**2001 National**  
**Land Cover Database**

**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 37, 38, and 39 - Yakima River Basin - NLCD

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