January 2015

PREPARED FOR: ASOTIN, COLUMBIA, GARFIELD COUNTIES; AND THE CITY OF CLARKSTON AND TOWN OF STARBUCK

Shoreline Inventory, Analysis, And Characterization Report

Southeast Washington Coalition Shoreline Master Program Update

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This report was funded through a grant from the Washington State Department of Ecology

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LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
°C	degrees Celsius
BP	before present
CAO	Critical Areas Ordinance
CCC	Columbia County Code
cfs	cubic feet per second
CMZ	Channel Migration Zone
CIA	cumulative impacts analysis
CMC	Clarkston Municipal Code
CRBG	Columbia River Basalt Group
DAHP	Washington State Department of Archaeology and Historic Preservation
DEM	Digital Elevation Models
DMA	disconnected migration areas
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
LiDAR	Light Image Detection and Ranging
LWD	large woody debris
MAF	mean annual flow
NASS	National Agricultural Statistics Service
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OHWM	ordinary high water mark
PDO	Pacific Decadal Oscillation
RCW	Revised Code of Washington
Reach Tables	Reach Characterization Tables

RM	river mile
SE WA	Southeast Washington
Sec.	Section
SMA	Shoreline Management Act
SMP	Shoreline Master Program
SR	subreach
SRSRB	Snake River Salmon Recovery Board
SSURGO	Soil Survey Geographic Database
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish & Wildlife
WRIA	Water Resource Inventory Area

1 INTRODUCTION

1.1 Background and Purpose

The Counties of Asotin, Columbia, and Garfield, along with the City of Clarkston (in Asotin County) and Town of Starbuck (in Columbia County), have formed the Southeast Washington (SE WA) Region Coalition[1] to update their Shoreline Master Programs (SMPs) in compliance with the Washington State Shoreline Management Act (SMA) and adopted state shoreline management guidelines. This work is funded by a grant from the Washington State Department of Ecology (Ecology). A primary purpose of this effort is to update the SMP to comply with Chapter 90.58 Revised Code of Washington (RCW), the SMA, and Ecology's 2003 Shoreline Master Program Guidelines (Chapter 173-26 Washington Administrative Code [WAC]).

This Inventory, Analysis, and Characterization (IAC) Report provides a technical foundation for the SE WA Region Coalition SMP update. This report includes a discussion of the setting and ecosystem-wide processes that influence ecological functions within the Coalition's shorelines. The IAC also discusses alterations based on existing land use patterns and future potential development within the shoreline jurisdiction areas. Reach Characterization Tables (Reach Tables) summarizing conditions by reach are provided in Appendices A though F. A map folio is provided in Appendix G.

The SMA guidelines require the Coalition to demonstrate that the SMP will result in no net loss to shoreline ecological functions during implementation. This report describes the existing baseline conditions of shoreline ecological function. An associated Shoreline Restoration and Protection Plan and Cumulative Impacts Analysis (CIA) will follow development of the draft SMP and code elements. The CIA will demonstrate how future development under the proposed SMP will result in no net loss of shoreline ecological function. The restoration measures described in the Shoreline Restoration and Protection

[1] In this report, the phrase "SE WA Region" refers to the area covered by this SMP update. The term "Coalition" refers to the counties of Asotin, Columbia, and Garfield, the City of Clarkston and the Town of Starbuck. The Cities of Asotin (Asotin County) and Dayton (Columbia County) are updating their respective shoreline master programs through separate planning processes.

Plan provide recommendations that could be implemented to improve existing conditions of the shoreline ecological functions.

1.2 Report Organization

The report is organized in the following sections:

- **Regulatory Overview** describes the SMA; local, state, and federal regulations, and cultural resource considerations.
- **Shoreline Jurisdiction Analysis** reviews the data and analysis used to determine the shoreline jurisdiction waterbodies and extents of the SMA shoreline jurisdiction.
- **Inventory** provides a description of the project area, including ownership and land cover characteristics, land use and SMP environment designations, geology, climate, surface water resources, water quality, floodplains and floodways, channel migration zones (CMZs), groundwater resources, geologic hazards, and cultural resources characteristics.
- **Shoreline Analysis and Characterization** describes the ecosystem processes and the level to which they are currently impaired or altered. The processes most critical to ecological functions are described for Asotin Creek, and the Grande Ronde, Snake, Touchet, and Tucannon rivers and their associated tributaries. Also included are a review of the reach characterization methods and an overview of the Reach Tables included in Appendices A through F. This section also provides an overview of the future land use and development potential analysis, which identifies developable lands and associated residential unit and commercial area available for specific geographic areas within the Coalition jurisdictions.
- **Public Access** identifies existing public access goals and policies.
- **Information Sources, Assumptions, and Limitations** are also described.

2 REGULATORY OVERVIEW

Counties, cities, and towns develop or update local SMPs to be in compliance with Washington State's SMA (RCW 90.58), and consistent with Ecology's guidelines. Washington's SMA addresses concerns about the effects of unregulated development on shorelines. The SMP update process indicates the joint state/local nature of the SMA program as local governments develop SMPs in close coordination with Ecology, are informed by local opportunities and constraints, and remain consistent with state laws and guidelines.

2.1 Local, State, and Federal Plans and Regulations

SMPs provide provisions to protect archaeological resources, historical resources, and environmentally critical areas within the shoreline, as well as to maintain flood hazard protection (WAC 173-26-221). The Coalition jurisdictions have existing SMPs, which will be updated to be compliant with Ecology's 2003 Shoreline Master Program Guidelines (WAC 173-26). Asotin County's current SMP was adopted in 1994, and the City of Clarkston has adopted Asotin County's 1994 SMP. Columbia County's and Garfield County's current SMPs were adopted in 1975. The Town of Starbuck's current SMP was adopted in July 1975.

Environmentally sensitive areas (critical areas) within the SE WA region include wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas. Each jurisdiction within the Coalition has critical areas regulations for these environmentally sensitive areas. Table 1 includes a summary of critical area buffer requirements for wetlands and for fish and wildlife habitat conservation areas, if identified in critical areas regulations for the Coalition jurisdictions.

Critical areas for each shoreline jurisdiction reach are also described within the *Flooding and Geological Hazards* and *Habitat Characteristics* sections of the Reach Characterization Tables provided in Appendix A through F. These areas are also identified, as applicable, in the map folio provided in Appendix G.

Table 1

Critical Areas Buffers Summary (as of 2014)

Jurisdiction	Code Reference	Protection Standards					
Asotin County	Ch. 18.18 (adopted 2007)	Asotin County adopted a CAO in the mid-1990s that does not provide specific buffer requirements for critical areas. A draft CAO update was prepared in 2002 but the draft was never adopted.					
Columbia County and Town of Starbuck[1]	**Wetlands**						
	CCC Ch. 16.10 Article VII (adopted 2008)	Wetland Delineation and Rating System		• Washington State Wetlands Identification and Delineation Manual, as amended • Washington State Wetlands Rating System documents – or as revised by Ecology			
		Buffers and Mitigation Ratios		**Category**			
				I	**II**	**III**	**IV**
		Buffer (feet)	High Intensity	300	200	100	50
			Moderate Intensity	250	150	75	35
			Low Intensity	200	100	50	25
		Mitigation Ratio	Restoration	6:1	3:1	2:1	1.5:1
			Preservation	10:1			
	Fish and Wildlife Habitat Conservation Areas						
	CCC Ch. 16.10 Article IV (adopted 2008)	Water Typing System		Per WAC 222-16-031			
		Riparian Habitat Buffer Widths (feet)		**Stream Type**			
				Type 1 and 2	**Type 3**	**Type 4 and 5**	
				250	150 – 200	150 - 200	
Garfield County	**Wetlands**						
	CAO Section 10.0 (adopted 2008)	Wetland Delineation and Rating System		• 1987 Federal Manual for Identifying and Delineating Jurisdictional Wetlands • Washington State Wetlands Rating System for Eastern Washington[2] (2004) – or as revised by Ecology			
		Buffers and Mitigation Ratios		**Category**			
				I	**II**	**III**	**IV**

Jurisdiction	Code Reference	Protection Standards					
		Minimum Buffer (feet)		200	100	50	25
		Mitigation Ratio (Replacement)	Forested	6:1	3:1	3:1	1.25:1 (Flood Plain Only)
			Scrub-Shrub		2:1	2:1	
			Emergent		1.5:1	1.5:1	
	Fish and Wildlife Habitat Conservation Areas						
	CAO Section 14.0 (adopted 2008)	Water Typing System		Standards are provided for DNR stream types and non-typed streams.			
		Riparian Habitat Area Widths (feet)		**Stream Type**			
				Type 1 and 2	**Type 3**	**Type 4 and 5**	
				250	150 – 200	150	
City of Clarkston	**Wetlands**						
	CMC 17.85.160 (Revised 2010)	Wetland Delineation and Rating System		• Washington State Wetlands Rating System for Eastern Washington (2004)			
		Buffers and Mitigation Ratios		**Category**			
				I	**II**	**III**	**IV**
		Minimum Buffer (feet)		250	200	150	50
		Mitigation Ratio		6:1	3:1	2:1	1.5:1
	Fish and Wildlife Habitat Conservation Areas						
	CMC 17.85.130 (Revised 2010)	Riparian Habitat Area Widths		A fish/wildlife habitat management and mitigation plan (included proposed establishment of buffers) shall be prepared by a biologist who is knowledgeable of wildlife habitat within southeastern Washington.			

Notes:
1 Town of Starbuck has adopted the Columbia County CAO.
2 While the CAO references the Western Washington version, the correct reference should be the Eastern Washington version, as noted in this table.
CAO = Critical Areas Ordinance
CCC = Columbia County Code
CMC = Clarkston Municipal Code
DNR = Washington State Department of Natural Resources

In addition, federal, state, and local regulations also apply to these areas. Examples of federal regulations that may apply include the Rivers and Harbors Appropriation Act of 1899 (Section 10), the Clean Water Act (Sections 404 and 401), Endangered Species Act (ESA), Migratory Bird Treaty Act, Federal Water Pollution Control Act, National Environmental Policy Act, National Historic Preservation Act, and the National Floodplain Insurance Program.

State regulations are administered through the RCW and include the State Environmental Policy Act, the Hydraulic Project Approval, the Bald Eagle Protection Rules, the Surface Mining Act, the State Water Code and Water Pollution Control Act, and the SMA. Local regulations are administered through city or county code, and may apply based on the SMA or other zoning, land use, and development standards.

2.2 Cultural Resources Protections for Shoreline Development

Federal, state, and local cultural resource laws apply to shoreline development. Section 106 of the National Historic Preservation Act requires a cultural resource review process for federally funded and permitted projects. State laws include RCW 27.53 (Archaeological Sites and Records), which prohibits the unpermitted removal of archaeological materials and establishes a permitting process, and RCW 27.44 (Indian Graves and Records), which describes how human remains must be treated.

3 SHORELINE JURISDICTION ANALYSIS

3.1 Shoreline Management Act Shoreline Criteria

The shoreline jurisdiction is the geographic area where the SMA applies and includes all Shorelines of the State and shorelands as defined by the SMA (RCW 90.58.030). Table 2 provides a summary of definitions for areas that are included within a shoreline jurisdiction.

Table 2
Shoreline Criteria Definitions per RCW 90.58.030 and WAC 173-26-020

Term	Definition
Shoreline Jurisdiction (WAC)	All "shorelines of the state" and "shorelands" as defined in RCW 90.58.030.
Shorelands (RCW)	• Those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark (OHWM) • Floodways and contiguous floodplain areas landward two hundred feet from such floodways; and • All wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter; the same to be designated as to location by the Ecology.
Shorelines of the State (RCW)	The total of all "shorelines" and "shorelines of statewide significance" within the state.
Shorelines (RCW)	All of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except: (i) shorelines of statewide significance; (ii) shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream segments; and (iii) shorelines on lakes less than twenty acres in size and wetlands associated with such small lakes.
Shorelines of Statewide Significance[1] (RCW)	The natural rivers or segments thereof as follows: (A) Downstream of a point where the annual flow is measured at two hundred cubic feet per second or more, or (B) Downstream from the first three hundred square miles of drainage area, whichever is longer.

Notes:
1 The definition provided is for streams and rivers of statewide significance east of the crest of the Cascade Range. See Revised Code of Washington (RCW; 90.58.030(2)(f) for full description of specific larger waterbodies under the classification of shorelines of statewide significance.
OHWM = ordinary high water mark
WAC = Washington Administrative Code

3.2 Study Area

The study area comprises Asotin, Columbia, and Garfield counties, which are located in the southeastern portion of Washington, and it includes the City of Clarkston and the Town of Starbuck. The counties are bordered by the State of Oregon to the south, the State of Idaho to the east, Walla Walla County to the west, and Whitman County to the north. A small length (0.7 miles) of the northwestern portion of Columbia County is bordered by Franklin County. The counties encompass a total area of 2,232 square miles (5,782 square kilometers), of which 2,213 square miles (5,731 square kilometers) are land and 19 square miles (50 square kilometers; 0.9%) are water.

3.3 Shorelines Currently Designated

Shorelines of the State and Shorelines of Statewide Significance for rivers and streams are designated by statutes in each County per the WAC Title 173 – Chapters 18 and 20.

Tables 3 and 4 in Sections 3.3.1 and 3.3.2 summarize the rivers and streams currently identified in the WAC as Shorelines of the State, including four rivers and streams that are currently identified as Shorelines of Statewide Significance.

3.3.1 Shorelines of Statewide Significance

Because Shorelines of Statewide Significance are major resources from which all people of the state derive benefit, local governments that are preparing SMP provisions for Shorelines of Statewide Significance shall give preference to uses that protect statewide interests, preserve resources for future generations, and provide priority uses and development standards that promote the principles in WAC 173-26-251.

The rivers and streams currently designated in the counties as Shorelines of Statewide Significance are summarized in Table 3. There are no lakes currently listed in WAC 173-20-080, WAC 173-20-170, or WAC 173-20-270 as meeting the criteria for Shorelines of Statewide Significance in the SE WA counties.

Table 3
Shorelines of Statewide Significance (Rivers and Streams) per WAC 173-18-060, WAC 173-18-110, and WAC 173-18-160

Stream Name	Description	Estimated Length (miles)
Asotin Creek	From the confluence of North and South Forks of Asotin Creek (Sec. 10, T9N, R44E) downstream to mouth on Snake River near Asotin (Sec. 16, T10N, R46E). This stream has a 300 square mile drainage area ending at mouth of George Creek (Sec. 24, T10N, R45E).	15.3
Grande Ronde River	From the Washington-Oregon boundary (Sec. 14, T6N, R43E) downstream to mouth at Snake River and Washington - Idaho boundary line (Sec. 13, T7N, R46E). This stream has over 300 square miles of drainage area.	38.3
Snake River	From Washington-Oregon boundary (Sec. 16, T6N, R47E) downstream to Garfield County line (Sec. 6, T11N, R45E), left bank only. This stream has both over more than 300 square miles of drainage area and over more than 200 cfs MAF at Washington-Oregon boundary.	117.2
Tucannon River	From the Umatilla National Forest boundary line (Sec. 35, T10N, R41E) downstream to mouth at Snake River (Sec. 3, T12N, R37E). This stream has more than 300 square miles of drainage area from a point originating at the confluence of Pataha Creek, where the Tucannon River becomes a shoreline of statewide significance (Sec. 24, T12N, R38E).	39.9

Notes:
WAC 173-18-110 (Columbia County) did not include the Snake River even though the river is within this county.
cfs = cubic feet per second
MAF = mean annual flow
Sec = section
WAC = Washington Administrative Code

3.3.2 Shorelines of the State

WAC 173-18-060, WAC 173-18-170, and WAC 173-18-270 identify nine other rivers and streams meeting requirements for Shorelines of the State that are not Shorelines of Statewide Significance in the counties. These waterbodies are summarized in Table 4. None of the lakes identified in WAC 173-20-070, WAC 173-20-160, or 173-20-260 meet the statutory thresholds Shorelines of the State.

Table 4
Shoreline Jurisdiction Rivers and Streams per WAC 173-18-060, WAC 173-18-110, and WAC 173-18-160

Stream Name	Description	Estimated Length (miles)
Asotin Creek (South Fork)	From the confluence of the South Fork Asotin Creek and the Alder Gulch Stream (Sec. 34, T9N, R44E) downstream to mouth at Asotin Creek (Sec. 10, same township).	4.4
Asotin Creek (North Fork)	From the Umatilla National Forest boundary (Sec. 19, T9N, R44E) downstream to mouth at Asotin Creek (Sec. 10, same township).	4.8
George Creek	From the confluence of George Creek and Pintler Creek (Sec. 36, T10N, R45E) downstream to mouth at Asotin Creek (Sec. 24, same township).	1.4
Joseph Creek	From the Oregon-Washington state line (Sec. 18, T6N, R46E) downstream to its mouth at Grande Ronde River (Sec. 26, T7N, R46E).	8.4
Pataha Creek	From the confluence of Pataha Creek and Totman Gulch Stream (Sec. 5, T11N, R41E) downstream to mouth at Tucannon River (Sec. 24, T12N, R38E).	19.8
Touchet River (South Fork)	From a point of (SE 1/4 of NE 1/4 of Sec. 5, T8N, R39E) downstream to mouth at Touchet River near Dayton (Sec. 32, T10N, R39E).	8.3
Touchet River (North Fork)	From the confluence of the North Fork Touchet River and unnamed creek (Sec. 28, T8N, R40E) downstream to Touchet River near Dayton (Sec. 32, T10N, R39E) (Note: called North Fork on Quad.) Excluding all federal lands.	15.3
Touchet River	From the confluence of North and South Forks of Touchet River (Sec. 32, T10N, R39E) downstream to Walla Walla County line (Sec. 7, T9N, R38E).	10.0
Robinson Creek[1]	From north line (Sec. 23, T9N, R39E) downstream to mouth at North Fork Touchet River (Sec. 11, same township).	2.9

Notes:
1 Robinson Creek is listed as Touchet River, Wolf Fork on U.S. Geological Survey topography maps.
cfs = cubic feet per second
MAF = mean annual flow
Sec = section

3.4 Preliminary Shoreline Jurisdiction Analysis and Findings for the Shoreline Master Program Update

A fundamental goal of the comprehensive SMP update is to ensure that all waterbodies meeting the statutory thresholds per RCW 90.58.030 and WAC 173-26-020 (see Table 2) are included in the SMP update. When a comprehensive SMP update is approved by Ecology, it becomes the official delineation of Shorelines of the State for that town, city, or county. The maps and lists of Shorelines of the State in the approved SMP will replace the lists of waterbodies contained in WAC 173-18 (rivers and streams) and WAC 173-20 (lakes). Local governments are responsible for determining the shoreline jurisdiction during the SMP planning process.

This section describes the analysis that was conducted to identify shorelines that meet the criteria defined in Table 2 and summarizes the suggested waterbodies to include in the SMP update.

3.4.1 Shoreline Jurisdiction Data Analysis

Anchor QEA reviewed the information in the WAC and compared it to a number of data sources to determine, as accurately as possible with the available data, which waterbodies in the SE WA region fit the definition of Shorelines of the State. Anchor QEA reviewed the existing datasets and classified the accuracy of the existing data to represent the OHWM of the shoreline. Anchor QEA received and downloaded Geographic Information System (GIS)-format datasets from the counties, U.S. Geological Survey (USGS), U.S. Department of Agriculture (USDA), U.S. Fish and Wildlife Service (USFWS), and Ecology containing information from a variety of sources about the waterbodies and potential shorelands within the study area.

Anchor QEA has reviewed and appended SMP, lakes, and rivers GIS datasets to identify those waterbodies that meet the definition of Shoreline of the State or Shoreline of Statewide Significance in RCW 90.58.030. Anchor QEA used several data sources in determining whether a waterbody met this definition. The following primary sources were used:

- Designated streams named in WAC 173-18-060, WAC 173-18-170, and WAC 173-1-270

- Ecology-suggested shoreline arcs (stream) and points (at which streams reach the threshold of significance)
- USGS National Hydrography Dataset (NHD)
- USDA National Agriculture Imagery Program 2013 imagery (USDA 2013)
- Google Earth historical aerial imagery
- USFWS National Wetland Inventory
- Federal Emergency Management Agency (FEMA) flood insurance rate maps

3.4.2 Identification and Verification of Shorelines Meeting the Definition of Shoreline of the State

The USGS's NHD area, flowline, and waterbody datasets, as well as Ecology-suggested shoreline polygon and line datasets, were used as a baseline for comparison. There were significant variations in the accuracy related to differences in the sources of data. In many cases, recent and historical aerial imageries were used to determine which of the available datasets provided the most accurate representation of the actual shoreline locations.

Anchor QEA used Ecology-suggested locations at which streams reach a mean annual flow of 20 cubic feet per second (cfs) or upstream drainage of 300 square miles to determine an initial upstream extent of the shoreline jurisdiction of several streams. A summary of the reviews is described in the Draft Shoreline Determination for Asotin, Columbia, and Garfield Counties Memorandum (Anchor QEA 2014a).

3.4.2.1 Identification of Shoreline Jurisdiction Rivers and Streams

The current shoreline jurisdiction waterbodies include four Shorelines of Statewide Significance. Anchor QEA's analysis confirmed the accuracy of the Shorelines of Statewide Significance listed in the Code (WAC 173-18 and 173-20). Shoreline lengths for the Shorelines of Statewide Significance are summarized in Table 5. The Snake River also includes the shoreline jurisdiction within the City of Clarkston, and the Tucannon River includes shoreline jurisdiction within the Town of Starbuck.

Table 5
Shorelines of Statewide Significance to be Included in the SMP Update

Stream Name	Included in Current Shoreline Master Programs	Total Length Proposed Shoreline
Asotin Creek	Yes	15.28 miles
Grande Ronde River	Yes	38.27 miles
Snake River	Yes	117.17 miles
Tucannon River	Yes	56.21 miles

The current SMPs for the counties also include nine other streams. Anchor QEA's analysis has appended seven streams and removed one (Pataha Creek), resulting in 15 streams.

Based on gage data reviewed for the rivers and streams currently designated as a shoreline under SMA within the SE WA counties, it appears Pataha Creek is not above the threshold needed for shoreline jurisdiction. However, because the estimated flows are near the threshold, additional flow data collection and evaluation is recommended, with a re-evaluation to occur during the next comprehensive update process (8 years from updated SMP adoption). Additional information on Pataha Creek was provided in a separate memorandum prepared for Garfield County that further explored flow data and associated recommendations for evaluating these data as they relate to flood flows and associated opportunities for updating floodplain and floodway designations (Anchor QEA 2014b).

Shoreline lengths for other shorelines to be included in the SMP update are summarized in Table 6.

Table 6
Other Shorelines to be Included in the SMP Update

Stream Name	Included in Current SE WA Counties SMP	Total Length Proposed Shoreline
Asotin Creek (South Fork)	Yes	3.70 miles
Asotin Creek (North Fork)	Yes	7.55 miles
George Creek	Yes[1]	1.43 miles
Joseph Creek	Yes	8.41 miles
Touchet River (South Fork)	Yes	16.12 miles

Stream Name	Included in Current SE WA Counties SMP	Total Length Proposed Shoreline
Touchet River (North Fork)	Yes	14.89 miles
Touchet River	Yes	10.05 miles
Touchet River (Wolf Fork)	Yes[2]	7.70 miles
Panjab Creek	No	2.19 miles
Mill Creek	No	1.13 miles
Wenaha River (North Fork)	No	1.11 miles
Butte Creek	No	5.25 miles
Third Creek	No	3.43 miles
First Creek	No	0.89 miles
Crooked Creek	No	6.29 miles

Notes:
1 Further evaluate inclusion/exclusion as shoreline jurisdiction waterbody in next comprehensive update.
2 Listed as Robinson Creek in Table 4.

3.4.3 Preliminary Shoreline Jurisdiction Areas

As discussed in Section 3.1, the shoreline jurisdiction is the geographic area where the SMA applies and includes all Shorelines of the State and Shorelands as defined by the SMA (RCW 90.58.030). Shorelines of the State to be included in the SMP update are summarized in Section 3.4.2. This section describes how the extent of the shoreline jurisdiction, including the shorelands, was determined.

The extent of the preliminary shoreline jurisdiction was determined (mapped) using the following steps:

- All shorelines meeting the definitions provided in Table 2 and identified above were buffered by a 200-foot shoreline jurisdiction area.
- All wetlands from the USFWS National Wetland Inventory dataset that intersected any part of the 200-foot shoreline jurisdiction area were provisionally included.
- Those wetlands identified were reviewed for spatial accuracy to determine if any part of them intersected the 200-foot shoreline jurisdiction area; if so, they were included.
- Any additional wetlands in the floodway of streams, meeting the shoreline definition above, were provisionally included.

- Those wetlands identified were reviewed for spatial accuracy to determine if any part of them intersected with the 200-foot shoreline jurisdiction area; if so, they were included.

The preliminary shoreline jurisdictions are shown in the map folio included as Appendix G.

3.5 Reach Breaks

Reaches are specific segments of the shoreline that are typically distinguished by the relative intensity of land use development patterns, the physical landscape, or critical biological processes. Reaches are numbered numerically (i.e., 1, 2, 3, etc.) with subreaches (SRs) listed alphanumerically (i.e., a, b, c, etc.). Reaches and subreaches provide the basis for the in-depth analysis and characterization information in this report. Physical changes often translate into differences in the function of the shoreline with regards to ecological and physical processes, which in turn may influence the shoreline designation.

The reach delineation was performed by evaluating aerial photography, topographic data, geologic maps, and land cover data, which were compiled in a GIS database. Specific factors that influenced the delineation of stream reaches include channel and floodplain geomorphology, geologic controls, channel confinement and modification, hydrology, and irrigation practices. Reaches were identified primarily to distinguish different patterns in land use, ownership, zoning, and level of development. Subreaches were delineated primarily where changes in land use, parcel density, or zoning affected the current or potential future ecosystem function.

A list of the reaches and subreaches for the shoreline jurisdiction areas within the SE WA region are provided in Table 7. If a river or stream has only one reach within a county, city or town shoreline area, then it was not numerically labeled (e.g., Starbuck Reach of the Tucannon River or the Mill Creek Reach within Columbia County).

Table 7
Reach and Subreaches

Shoreline	Reach (SR)	Jurisdiction(s)
Asotin Creek and associated tributaries		
Asotin Creek	Reach 1 (SR 1a – 1e)	Asotin County
South Fork Asotin Creek	South Fork Asotin	
North Fork Asotin Creek	North Fork Asotin	
George Creek	George Creek	
Grande Ronde River and associated tributary		
Grande Ronde River	Reach 1 (SR 1a – 1d) Reach 2 (SR 2a – 2e)	Asotin County
Joseph Creek	Reach 1 (SR 1a – 1c)	
Snake River		
Snake River	Reach 1 (SR 1a – 1g) Reach 2 (SR 2a – 2c) Reach 3 (SR 3a – 3c)	Asotin County
	Reach 4 and 5	Garfield County
	Reach 6 and 7	Columbia County
	Clarkston (SR 1a – 1c)	City of Clarkston
South Columbia and Garfield Counties Forest Service Land Creek Group (Forest Service Creek Group)		
Mill Creek	Mill Creek	Columbia County
North Fork Wenaha River	North Fork Wenaha River	
Butte Creek	Butte Creek	
Third Creek	Third Creek	Columbia and Garfield County
Crooked Creek	Crooked Creek	
First Creek	First Creek	Garfield County
Touchet River and associated tributaries		
Touchet River	Reach 1 (SR 1a – 1d)	Columbia County
South Fork Touchet River	Reach 1 (SR 1a –1c)	
Wolf Fork Touchet River	Reach 1 (SR 1a – 1c)	
North Fork Touchet River	Reach 1 (SR 1a – 1d)	
Tucannon River and associated tributary		
Tucannon River	Reach 1 (SR 1a and 1b)	Columbia and Garfield County
	Reach 2 (SR 2a – 2g)	Columbia County
	Starbuck	Town of Starbuck
Panjab Creek	Panjab Creek	Columbia County

Note:
SR = subreach

4 INVENTORY

Section 4 provides an inventory of the existing shoreline areas. The review includes information on existing land use, zoning, shoreline designations, geology, climate, water resources, geologic hazards, and historical and cultural resources.

4.1 Ownership

The SE WA region shorelines have unique ownership. The lower Snake River has four hydropower dams: Ice Harbor Dam; Lower Monumental Dam; Little Goose Dam; and Lower Granite Dam. Two of these dams – Little Goose Dam and Lower Granite Dam – are located within the SE WA region. Additionally, the Umatilla Forest areas are located within the SE WA region. Especially in Columbia and Garfield counties, the shorelines areas are under significant federal ownership.

The Asotin Creek, Tucannon, Touchet, and Grande Ronde rivers shorelines include a mix of ownership types; however, as can be seen in Tables 8 through 17, areas in these reaches are under significant federal and state ownership.

Table 8
Ownership Types within the Asotin Creek[1] Shorelines (Asotin County)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Forest Service	114	8%
	State	Washington State Department of Natural Resources	167	12%
		Washington State Department of Fish and Wildlife	280	20%
	Local	Asotin County (Park)	18	less than 1%
		Private	843	59%
		TOTAL	1,422	100%

Note:
1 Includes associated tributaries of the South Fork and North Fork of Asotin Creek, and George Creek.

Table 9

Ownership Types within the Grande Ronde River[1] Shorelines (Asotin County)

Ownership Type		Owner	Acreage	Percentages
	Federal	U.S. Bureau of Land Management	594	18%
		U.S. Fish and Wildlife Service	2.0	Less than 1%
	State	Washington State Department of Natural Resources	70	2%
		Washington State Department of Fish and Wildlife	548	17%
	Local		0	0
		Private	2,043	63%
		TOTAL	3,257	100%

Note:
1 Includes associated tributary of Joseph Creek.

Table 10

Ownership Types within the Snake River Shorelines (Asotin County)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Bureau of Land Management	221	6%
		U.S. Forest Service	0.1	Less than 1%
		U.S. National Park Service	0.7	Less than 1%
		U.S. Army Corps of Engineers	969	26%
	State	Washington State Department of Natural Resources	36	1%
		Washington State Department of Fish and Wildlife	9	Less than 1%
		Washington State Parks and Recreation	128	3%
	Local	Port of Clarkston	14	Less than 1%
		Private	2,327	63%
		TOTAL	3,703	100%

Table 11

Ownership Types within the Snake River Shorelines (Columbia County)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Army Corps of Engineers	2,288	58%
		U.S. Bureau of Land Management	13	Less than 1%
	State	None	0	0
	Local	None	0	0
		Private	1,632	41%
		TOTAL	3,932	100%

Table 12

Ownership Types within the Snake River Shorelines (Garfield County)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Bureau of Land Management	3	Less than 1%
		U.S. Army Corps of Engineers	3,030	50%
	State	Washington State Department of Natural Resources	82	1%
		Private	2,971	49%
		TOTAL	6,087	100%

Table 13

Ownership Types within the Snake River Shorelines (City of Clarkston)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Army Corps Of Engineers	64	25%
	State	None	0	0
	Local	City of Clarkston	2.3	1%
		Port of Clarkston	19	7%
		Private	177	68%
		TOTAL	260	100%

Table 14

Ownership Types within the Forest Service Creek Group Shorelines

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Forest Service	905	100%
	State	None	0	0
	Local	None	0	0
		Private	0	0
		TOTAL	905	100%

Table 15

Ownership Types within the Touchet River Shorelines[1] (Columbia County)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	None	0	0
	State	Washington State Department of Natural Resources	168	7%
		Washington State Parks	6	Less than 1%
	Local	Confederated Tribes of the Umatilla Indian Reservation	392	16%
		Private	1,942	77%
		TOTAL	2,509	100%

Note:
1 Includes associated tributaries of South Fork, Wolf Fork, and North Fork Touchet rivers.

Table 16

Ownership Types within the Tucannon River[1] Shorelines[2] (Columbia and Garfield[3] Counties)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Forest Service	566	18%
		U.S. Army Corps of Engineers	165	5%
	State	Washington State Department of Fish and Wildlife	682	21%
		Washington State Department of Natural Resources	15	Less than 1%
		Washington State Parks	Less than 1	Less than 1%
	Local	None	0	0
		Private	1,769	55%
		TOTAL	3,197	100%

Notes:
1 Includes associated tributary of Panjab Creek.
2 Excludes Town of Starbuck data. See Table 17 for ownership types in Town of Starbuck.
3 The Tucannon River is almost entirely within Columbia County. A portion of SR 1a is within Garfield County.

Table 17
Ownership Types within the Tucannon River Shorelines (Town of Starbuck)

Ownership Type		Owner	Acreage	Percentages
Public	Federal	None	0	0
	State	None	0	0
	Local	Town of Starbuck	[1]	Undetermined
		Private	Greater than 50	Undetermined
		TOTAL	59	100%

Note:
1 The verification of Town-owned property at the "Old Swimming Hole" was in process at the time of publication of this report.

4.2 Land Cover

Land cover describes the surficial land composition analyzed from satellite and aerial imagery. In the SE WA region, the predominant land cover type within the shoreline jurisdiction is identified as forest and grassland land cover, followed by developed and shrubland making up the second largest land cover group. Tables 18 through 23 summarize the land cover types in the SE WA region shoreline jurisdiction, based on the data derived from USDA, National Agricultural Statistics Service (NASS) cropland data layer. (Note that the acreage totals in Table 18 through 23 may not match directly with acreage totals in Tables 8 through 17 due to differences in calculations among different data layers.)

Table 18
Land Cover Type for Asotin Creek[1]

Land Cover Type	Asotin County	
	Acreage	Percentage of Total
Agricultural	12.3	0.9%
Developed	156.2	11.0%
Fallow/Idle Cropland	2.3	0.2%
Forest	352.4	24.8%
Grassland	830.5	58.4%
Shrubland	38.5	2.7%
Wetlands	29.2	2.1%
TOTAL	**1,421.5**	**100%**

Note:
1 Includes associated tributaries. See Table 7.
Source: USDA-NASS Cropland Data 2012

Table 19

Land Cover Type for Grande Ronde River[1]

Land Cover Type	Asotin County	
	Acreage	Percentage of Total
Agricultural	9.6	0.3%
Barren	0.2	0.0%
Developed	164.4	5.1%
Fallow/Idle Cropland	2.6	0.1%
Forest	260.5	8.0%
Grassland	1,177.3	36.2%
Open Water	827.6	25.4%
Shrubland	809.3	24.9%
Wetlands	1.9	0.1%
TOTAL	**3,253.4**	**100%**

Note:
1 Includes associated tributaries. See Table 7.
Source: USDA-NASS Cropland Data 2012

Table 20

Land Cover Type for Snake River

Land Cover Type	Asotin County		Columbia County		Garfield County	
	Acreage	Percentages	Acreage	Percentages	Acreage	Percentages
Agricultural	16.0	0.4%	4.6	0.1%	9.2	0.2%
Barren	2.1	0.1%	0	0.0%	0	0.0%
Developed	505.6	13.0%	106.8	2.7%	97.1	1.6%
Fallow/Idle Cropland	2.6	0.1%	2.2	0.1%	0.4	0.0%
Forest	61.2	1.6%	5.9	0.2%	82.9	1.4%
Grassland	206.5	5.3%	89.7	2.3%	286.4	4.7%
Open Water	2,665.5	68.7%	3,378.9	86.0%	5,162.3	85.1%
Shrubland	371.3	9.6%	332.6	8.5%	367.3	6.1%
Wetlands	51.3	1.3%	8.2	0.2%	62.1	1.0%
TOTAL	**3,882.2**	**100%**	**3,929.1**	**100%**	**6,067.5**	**100%**

Source: USDA-NASS Cropland Data 2012

Table 21

Land Cover Type for Forest Service Creek Group

Land Cover Type	Columbia County		Garfield County	
	Acreage	Percentages	Acreage	Percentages
Forest	534.0	98.4%	315.9	87.5%
Grassland	1.1	0.2%	2.4	0.7%
Shrubland	7.7	1.4%	42.7	11.8%
TOTAL	**542.7**	**100%**	**361.0**	**100%**

Source: USDA-NASS Cropland Data 2012

Table 22

Land Cover Type for Touchet River[1]

Land Cover Type	Columbia County	
	Acreage	Percentage of Total
Agricultural	62.3	2.5%
Developed	202.6	8.1%
Fallow/Idle Cropland	5.4	0.2%
Forest	1,288.6	51.4%
Grassland	674.4	26.9%
Open Water	0.1	0.0%
Shrubland	167.5	6.7%
Wetlands	106.3	4.2%
TOTAL	**2,507.4**	**100%**

Note:
1 Includes associated tributaries. See Table 7.
Source: USDA-NASS Cropland Data 2012

Table 23

Land Cover Type for Tucannon River[1]

Land Cover Type	Columbia County		Garfield County	
	Acreage	Percentages	Acreage	Percentages
Agricultural	93.8	3.7%	0	0.0%
Developed	129.3	5.1%	29.3	4.1%
Fallow/Idle Cropland	0.1	0.0%	0	0.0%
Forest	519.9	20.4%	661.8	93.4%
Grassland	1,433.0	56.3%	5.4	0.8%
Open Water	28.8	1.1%	0.1	0.0%
Shrubland	221.9	8.7%	12.1	1.7%

Land Cover Type	Columbia County		Garfield County	
	Acreage	Percentages	Acreage	Percentages
Wetlands	118.6	4.7%	0	0.0%
TOTAL	**2,545.3**	**100%**	**708.8**	**100%**

Note:
1 Includes associated tributaries. See Table 7.
Source: USDA-NASS Cropland Data 2012

4.3 Land Use and Zoning

The SE WA region provides a blend of uses, including recreational, hydro-electric dams, farming, irrigation, barging, tourism, industrial facilities, and port uses along shorelines.

Current zoning within each jurisdiction's zoning codes is summarized in Table 24 and discussed further in this section below.

Table 24
Summary of SE WA Coalition Zoning

Waterbody and Associated Tributary(ies)	Asotin County	Land Use/Zoning Garfield County	Columbia County
Asotin Creek	Rural Residential, Agricultural/Transition	NA	NA
Grande Ronde River	Rural Residential Agricultural	NA	NA
Snake River	Agricultural, Agricultural/Transition, Rural Residential Urban (Clarkston)	Agricultural, Industrial	Agricultural (A-1), Heavy Industrial (H-I)
Forest Service Creek Group	NA	NA	Watershed (W-1)
Touchet River	NA	NA	Agricultural (A-1), Agricultural (A-2), Agricultural-Residential (AR-1), Agricultural-Residential (AR-2)
Tucannon River	NA	NA	Agricultural (A-1), Agricultural (A-2), Recreational (R-1), Heavy Industrial (HI-1)

Notes:
NA = Not applicable

Due to the lack of digital data, the following information was obtained from reviewing current zoning designations, current shoreline designations, and the existing land uses in the area from aerial photographs and area site visits. Table 31 in Section 6 of this document provides a listing of existing public access opportunities by reach.

4.3.1 Asotin Creek

Approximately half of the Asotin Creek drainage and its associated tributaries are zoned Agricultural/Transition, and the other half is zoned Rural Residential. There are several farms along the mainstem of Asotin Creek. North Fork and South Fork Asotin Creek fall within the boundaries of the Washington Department of Fish & Wildlife (WDFW)-owned and managed Asotin Wildlife Area. Headgate County Park is located on the Main Stem of Asotin Creek and provides recreational opportunities. The surrounding area is predominately agriculture with a combination of livestock grazing and dryland wheat farming. See Appendix A for additional detail by reach and subreach.

4.3.2 Grande Ronde River

Almost all of the Grande Ronde River shoreline is zoned Rural Residential, with the exception of Joseph Creek, which is zoned Agricultural. Where the land is privately held, there are recreational properties and farms/ranches. The area is not densely populated. The surrounding area is mostly agricultural. There is one commercial property, Boggan's Oasis Restaurant, where Highway 129 crosses over the Grande Ronde River. See Appendix B for additional detail by reach and subreach.

4.3.3 Snake River

Most reaches of the Snake River are zoned Rural Residential in Asotin County, and Agricultural in Garfield and Columbia Counties. Zoning within the City of Clarkston is Urban.

The Snake River has several Port-owned or private industrial areas where grain elevators are located next to barge-loading facilities, and these are zoned as Industrial or Heavy Industrial. There are also industrial areas adjacent to the two hydro-electric dams in the area. See Appendix C for additional detail by reach and subreach.

4.3.4 Forest Service Group

The Forest Service Group of streams either are zoned Watershed (W-1) or not zoned at all. The surrounding area is mostly heavily forested, unoccupied space. See Appendix D for additional detail.

4.3.5 Touchet River

The Touchet River and its associated tributaries include Agricultural-Residential (AR-1 and AR-2) and Agricultural (A-1 and A-2) zones. The surrounding land is almost entirely agriculture, residential, and open space. See Appendix E for additional detail by reach and subreach.

4.3.6 Tucannon River

The Tucannon River and its tributaries are mostly zoned Agricultural (A-1 and A-2) and Recreational (R-1). The Umatilla National Forest is unzoned and the town of Starbuck does not have zoning. The entire watershed is a patchwork of private residences, farms, and recreation sites, such as campgrounds and river access points. The surrounding upland area outside the riparian vegetation is mostly open space and dryland agriculture. See Appendix F for additional detail by reach and subreach.

4.4 Current Shoreline Master Program Environment Designation

In existing SMPs, each jurisdiction has its own definitions for the shoreline designations. The majority of the shorelines are designated Natural, Conservancy, Rural, or Urban; some small areas within Asotin County are designated Suburban. Existing SMP environment designations within the shorelines are summarized in Table 25 and discussed further in this section.

Table 25
Summary of SE WA Coalition Shoreline Environment Designations

Waterbody and Associated Tributary(ies)	Current SMP Environment Designations		
	Asotin County	Garfield County	Columbia County
Asotin Creek	Natural, Rural, Conservancy	NA	NA
Grande Ronde River	Rural, Conservancy	NA	NA
Snake River	Conservancy, Rural, Suburban, and Urban	Conservancy, Rural	Conservancy, Rural, and Urban
Forest Service Creek Group	NA	Rural	Rural
Touchet River	NA	NA	Rural
Tucannon River	NA	Rural	Conservancy or Rural

Notes:
NA = Not applicable
SMP = Shoreline Master Program

The following definitions are from the 1994 Asotin County Shorelines Management Program (Asotin County 1994) and are similar to definitions currently in place for the SE WA region.

4.4.1 Natural

The intent of the Natural environment designation is to preserve and restore those natural resource systems existing relatively free of human influence and those shoreline areas possessing natural characteristics intolerant of human use or possessing unique historical, cultural, or educational features. These systems require several restrictions on the intensities and types of uses permitted so as to maintain the integrity of the shoreline environment.

A small portion of the Snake River, just north of the Oregon Border in Asotin County, is designated as Natural under the current SMP.

4.4.2 Conservancy

The intent of the Conservancy environment designation is to protect, conserve, and manage existing natural resources and valuable historical and cultural areas to achieve sustained resource utilization and provide recreational opportunities. The Conservancy environment designation is also intended to protect environmentally sensitive areas that are unsuitable for

intensive use, such as steep slopes, flood-prone areas, eroding bluffs, wetlands, and areas that cannot provide adequate sewage disposal. Examples of appropriate uses in a Conservancy environment include dispersed outdoor recreation activities, timber harvesting on a sustained-yield basis, passive agricultural uses such as pasture and range lands, and other related, low-intensity uses and activities.

Portions of the Grande Ronde River, North Fork Asotin Creek, and Tucannon River (Umatilla Forest) are designated Conservancy under the current SMP.

4.4.3 Rural

The Rural environment designation is intended to protect agricultural land from urban expansion, restrict intensive development along undeveloped spaces, and provide opportunities for recreational uses compatible with agricultural and forestry uses.

Some portion of shorelines in the SE WA region is currently designated Rural, including Asotin Creek, Grande Ronde River, Snake River, Forest Service Creek Group, Touchet River, and Tucannon River. Most of Columbia County shorelines are designated Rural under the current SMP.

4.4.4 Urban

The Urban environment is an area of high-intensity land use, including residential, commercial, and industrial development. The purpose of this environment is to ensure optimum utilization of shorelines that are either presently urbanized or planned for urbanization. Development in urban areas should be managed to enhance and maintain the shorelines for a variety of urban uses, with priority given to water-dependent, water-related, and water-enjoyment uses.

Only small portions of these waterways within the SE WA region have an SMP designation of Urban under the current SMP. These areas include the City of Clarkston on the Snake River, the outlying areas around the City of Asotin on Asotin Creek, and the Town of Starbuck. These areas are important to the ports and provide trails and recreation opportunities.

4.4.5 Suburban

The Suburban environment designation is intended to serve as a transition area between areas with the more intense Urban environment designation and the low-intensity uses of land with the Rural environment designation. It includes shoreline areas that presently support low- to medium-intensity uses, where existing densities permit space for small numbers of livestock, gardens, or woodlots. The Suburban environment designation provides for permanent residential and recreational activities outside urban areas, where adequate facilities for sewage disposal and water supply can be provided. The Suburban Designation is limited to private lands south of the Southway Bridge.

4.5 Shoreline Uses

Shoreline uses are described in this section, including water dependent, water related and water enjoyment.

4.5.1 Water-dependent Uses

Water-dependent use means a use or portion of a use that cannot exist in a location that is not adjacent to the water and is dependent on the water by reason of the intrinsic nature of its operations (WAC 173-26-020(36)). Water-dependent uses commonly include fishing, water withdrawal, cargo loading/unloading, etc.

4.5.1.1 Asotin Creek and Associated Tributaries

Asotin Creek water-dependent uses include irrigation withdrawals and fishing, including access points at Headgate Park and the Blankenship Access.

4.5.1.2 Grande Ronde River and Associated Tributaries

Boat launches include C. Boggan, Shumaker Grade Recreation Area and the Ebson boat launches. The Grande Ronde also provides steelhead and other fishing opportunities.

4.5.1.3 Snake River and Associated Tributaries

The Snake River hosts a variety of water-dependent uses, including commercial barge traffic, recreational boating access and hydro-electric generation. Two hydro-electric power dams

(Lower Granite and Little Goose) generate electricity, and they also facilitate barge traffic along the Snake River in Garfield, Asotin, and Whitman counties.

Recreational opportunities, including boat launches, are abundant in this area as is shown in Table 31 in Section 6 below. Tour boat docking is also a significant use by volume.

Water-dependent uses within the Port of Clarkston include boating, barge loading facilities, and dry docking areas.

Several boat launches are available in the area, including several marinas: Lyon's Ferry Marina in Columbia County; and Hell's Canyon Marina (Resort), Swallows Nest Marina, and Confluence Marina in Asotin County.

4.5.1.4 Forest Service Creek Group

This area is quite remote, and there are no formal access areas (based on existing information).

4.5.1.5 Touchet River and Associated Tributaries

There are some industrial uses along the Touchet River which are water-dependent, including a wastewater treatment plant. Water diversions for irrigated agriculture are also water-dependent uses.

4.5.1.6 Tucannon River and Associated Tributaries

Diversions for recreational lakes in the upper reaches of the Tucannon River and for irrigated agriculture are water-dependent uses in this watershed.

4.5.2 Water-related and Water-enjoyment Uses

Water-related use means a use or portion of a use, which is not intrinsically dependent on a waterfront location but whose economic viability is dependent upon a waterfront location because: a) the use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or b) the use

provides a necessary service supportive of the water-dependent uses, and the proximity of the use to its customers makes its services less expensive and/or more convenient (WAC 173-26-020 (40)).

Water-enjoyment use means a recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use. It can also be defined as a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use, and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public, and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment (WAC 173-26-020 (37)).

4.5.2.1 Asotin Creek and Associated Tributaries

Sites in Asotin Creek areas that provide water-related uses include Headgate County Park and Blankenship. These sites are regularly used for fishing and wildlife viewing. The tributaries of the North Fork and South Fork Asotin Creek, along with George Creek, also provide wildlife viewing, hiking, and other water-enjoyment uses.

4.5.2.2 Grande Ronde River and Associated Tributaries

The Grande Ronde and its associated tributaries have several recreational water-related uses, including fishing, camping, and wildlife viewing.

4.5.2.3 Snake River and Associated Tributaries

The Snake River and its associated tributaries provide several water-related uses, including fishing, camping, stream-side hiking, wildlife viewing, and hunting, especially at the habitat enhancement areas. In the City of Clarkston, the Port of Clarkston has developed pedestrian and bike paths along the river that provide water-enjoyment opportunities.

4.5.2.4 Forest Service Creek Group

The Forest Service creeks provide fishing and hiking trails.

4.5.2.5 Touchet River and Associated Tributaries

The Touchet River includes the Lewis and Clark State Park, which provides water-enjoyment opportunities such as fishing, camping, and wildlife viewing.

4.5.2.6 Tucannon River and Associated Tributaries

The Tucannon River provides fishing, camping, hiking, and wildlife viewing opportunities.

4.5.3 Non-water-related Uses

Non-water-related uses include uses not intrinsically dependent on a waterfront location and not economically dependent upon a waterfront location. These uses in the region include agricultural land, rangeland, and other rural uses.

4.6 Geology

The SE WA region is within the Columbia Basin and Blue Mountains physiographic regions of the State. Major geologic units within the area include (from oldest to youngest): pre-Tertiary igneous and metamorphic rock at the bottom of Snake River and Tucannon River canyons, middle to late Miocene flood basalt flows of the Columbia River Basalt Group (CRBG) and interbedded continental sediments, Miocene to Pleistocene gravels found in the Snake River and Grande Ronde River basins, Pleistocene Cataclysmic Flood deposits (Missoula and Bonneville Floods) found along the Snake River and other tributary canyons, Pleistocene to Holocene loess from the Palouse Formation, Pleistocene to Holocene mass-wasting deposits, and Pleistocene to Holocene alluvium deposits (Kennedy/Jenks 2005).

The surficial geology, soils, and topography of the region are defined by glacial outburst flooding from the Missoula and Bonneville Floods on ridges and lower reaches of Snake River tributaries, loess in upland areas, and alluvium and mass-wasting deposits in stream valleys and canyons (Kennedy/Jenks 2005). The geologic makeup of the SE WA counties is the result of erosion of pre-floods geologic units, deposition of sediments carried by floodwaters, and the formation of the unique topographic features that influence present-day hydrology.

The stratigraphic unit underlying the SE WA counties consists primarily of Miocene-aged CRBG flows. These units underlie the project area, except for some areas where pre-CRBG rocks crop out in deeply incised canyons in the Blue Mountains (Kennedy/Jenks 2005). The CRBG bedrock units were formed by numerous separate flows of molten volcanic rock, resulting in stratified layers of rock with distinct contacts that are visible between each volcanic event. The cooling process of each of these types of lava flows resulted in a relatively dense but highly jointed rock that is subject to fracturing and erosion. Metamorphism of the CRBG also contributed to its weakness and the development of the fold axis that later became preferential pathways for floodwaters (Grolier and Bingham 1978).

Pre-Tertiary rocks are assumed to underlie the SE WA region below the CRBG units. Some pre-Tertiary rocks are exposed in locations throughout the area, including in the Tucannon River valleys, along the Snake River upstream of Lower Granite Dam, and south of the Town of Asotin along the Snake River (Kennedy/Jenks 2005).

Geology specific to the major waterbodies is described in the sections below. See Table 7 for a description of the individual tributaries and creeks associated with each major waterbody.

4.6.1 Asotin Creek and Associated Tributaries

In its lower reaches, Asotin Creek occupies a fairly wide alluvial valley (relative to its size) with bedrock valley margins and walls that consist mostly of Grand Ronde Basalt throughout. The stream is mostly a single-thread, low-gradient channel. The stream is locally confined by infrastructure, which limits the migration potential throughout portions of the valley. In places, the stream valley narrows where the stream is confined in the bedrock valley. The North Forth and South Fork Asotin Creek segments occupy narrow bedrock valleys with valley bottoms, which consist of mostly of alluvium and valley walls, and margins, which consist of Grande Ronde Basalt. Loess (wind-blown silt) deposits of the Palouse Formation (Quaternary age) are found throughout the area where the sediment rests atop high-relief areas within the watershed. Outburst flood deposits are found along one segment of the lower reach of the stream.

4.6.2 Grande Ronde River and Associated Tributary

Throughout Asotin County, the Grande Ronde River is a single-thread channel that occupies a mostly narrow, steep-walled bedrock valley mostly comprising middle-Miocene aged (15.6 to 17 million years ago) Grande Ronde Basalt. The Grand Ronde Basalt is the thickest sequence of the CRBG and makes up the majority (by volume) of the CRBG (Reidal 1992). At the confluence of the Grande Ronde and Snake rivers, the thickest sequence of Grande Ronde Basalt is exposed and totals 800 meters in height and consists of 35 flows varying in thickness from 30 to 75 meters (Reidal 1992). At the confluence of the Grande Ronde and Snake rivers is a formation known as Lime Point, which has been noted for its potential value as a source for Portland cement material since the early 1900s (Eckel 1913).

Bar deposits consisting of locally derived alluvium (Holocene Age) occur throughout the valley bottom. Continental sedimentary rocks of Quaternary-Miocene age are also exposed along the segment of the channel. The river has carved a very sinuous, stable path through the bedrock along most of its reach through Asotin County. Outburst flood deposits are not mapped along river's extent.

Joseph Creek flows through the Imnaha Basalt (bedrock valley) along most of its course throughout Asotin County. The Imnaha Basalt flow predates the Grande Ronde Basalt flow and is part of the CRBG. The overall channel planform is not as sinuous as the Grand Ronde River. The stream flows within a fairly confined valley that narrows and steepens upstream at Joseph Canyon. Bar deposits have formed locally throughout the valley bottom and consist of alluvium. Pleistocene-age outburst flood deposits can be found along the valley margins along the lower 3 miles of this stream.

4.6.3 Snake River

The Snake River watershed includes Grande Ronde, Wanapum, and Pomona members of the CRBG with recent Quaternary river alluvium along the valley floor. Larger areas of Clarkston gravel, consisting of well-rounded cobbles and small boulders, are found at the confluence of the Snake and Clearwater rivers near the Washington/Idaho border (Hooper et al. 1985). Throughout the study area, the Snake River is a single -thread channel

containing a few larger channel-islands (New York Island in Columbia County and Silcott Island in Asotin County).

4.6.4 Forest Service Creek Group

The watersheds of southern Columbia and Garfield counties contain Saddle Mountains and Wanapum members of the CRBG. Within these narrow, single-channel systems, a narrow band of alluvium blankets the river or creek valley floor (Schuster 1993).

4.6.5 Touchet River and Associated Tributaries

The Touchet River watershed includes Wanapum and Grande Ronde members of the CRBG. The basalt layer received large volumes of loess during the Pleistocene. The basalt bluffs along the valley walls laterally confine the river and the basalt of the river bottom is overlain with alluvium deposits from upstream sources of silt, sand, and outwash gravel. Within the upstream segments of the North Fork, Wolf Fork, and Robinson Fork of the river, the channels are located within steep, relatively narrow (two-channel width) bedrock valleys. Further downstream, the valley widths increase and the channel transitions from moderately confined to unconfined. Channel types are predominately single-thread within these upper reaches, transforming to more braided, gravel-bar-dominated sections and anabranching sections downstream (GeoEngineers 2011).

4.6.6 Tucannon River and Panjab Creek

The Tucannon basin consists primarily of Miocene-aged CRBG flows of the Grande Ronde, Wanapum, and Frenchman Springs members with recent Quaternary river alluvium along the valley floor. Basalt is exposed at the surface upstream of Tumalum Creek (River mile [RM] 35.5) and along the valley walls and gullies down from Tumalum Creek to RM 18. Downstream of RM 18, including within the Pataha and Willow Creek subbasins, the basalt is overlain by loess deposits (fine sand and silt) of the Palouse Formation. In these areas, bedrock is only exposed in gullies and along valley slopes. The valley walls in much of the lower basin downstream of RM 18 comprise Quaternary flood outburst deposits consisting of stratified sand, gravel, and cobble. Alluvial fans line the valley floor at the mouths of tributaries; the fans tend to be large and wide in locations where tributaries drain loess-dominated subbasins, and small and narrow in basins where mainly bedrock is exposed.

Panjab Creek is a tributary to the Tucannon River in the upper watershed. The stream flows within a narrow, incised bedrock valley as a single-thread channel.

4.7 Climate

The SE WA region falls within the Palouse Blue Mountains region of Washington (NOAA 2014a; NOAA 2014b). Annual precipitation is between 10 to 20 inches over most of the agricultural section and increases to 40 inches or more in the higher elevations of the Blue Mountains. The average winter season snowfall varies from 20 to 40 inches. Snow can be expected in November and remain on the ground from periods ranging from a few days to two months between the first of December and March. Snowfall and the depth on the ground increase along the slopes of the mountains.

High temperatures in January can range from 34 °F in the Palouse Hills and 38 °F in the Snake and Walla Walla River valleys. The average minimum temperature varies from 20 to 25 °F. Summer high temperatures are usually in the high 80s with low temperatures in the middle 50s (WRCC 2014).

4.8 Water Resources

This section includes an inventory of water resources within the SE WA Counties, including resources that do not fall under the shoreline jurisdiction. Water resources discussed in this section include surface water resources and quality, floodplains and floodways, CMZs, and groundwater.

4.8.1 Surface Water Resources

The planning area is located in three Water Resource Inventory Areas (WRIAs): WRIA 35 – Middle Snake; WRIA 32 – Walla Walla; and WRIA 33 – Lower Snake. Several major surface water resources are located in the planning area, including Grande Ronde River, Asotin Creek, Snake River, Tucannon River, and Touchet River. Other tributaries in the planning area drain to the creeks and rivers listed above. Less than 1% of the planning area (19 of 2,232 square miles) is water. Although some small lakes are located within the planning area, no lakes are large enough to reach shoreline jurisdiction threshold.

Surface water resources in the planning area generally have lower flows in late summer and fall and high flows in the spring. The highest flows are typically generated from snowmelt runoff after temperatures are warm enough to melt snowpack accumulated from winter precipitation events.

In the Northwest region of the United States, observed regional warming has been linked to changes in the timing and amount of water availability in basins with significant snowmelt contributions to stream flow (Melillo et al. 2014). Hydrologic response to climate change will depend upon the dominant form of precipitation in a particular watershed, as well as other local characteristics, including elevation, aspect, geology, vegetation, and changing land use. The largest responses are expected to occur in basins with significant snow accumulation, where warming increases winter flows and advances the timing of spring melt (Melillo et al. 2014).

This may be further affected by Pacific Decadal Oscillation (PDO) that also influences climate conditions. The PDO, sometimes referred to as El Niño and La Niña, is a pattern of Pacific climate variability that results in decades-long (15- to 30-year) warm and cooler weather patterns associated with North Pacific Ocean surface water temperature conditions (UW 2000). These climate influences may have an effect on hydrology, including stream flow changes and lake expansion and contraction over time, associated riparian vegetation conditions, and shifts in the OHWM.

The Snake River drains the majority of the planning area. The Snake River enters the planning area at the southeast corner of Asotin County, then runs north along the eastern boundary of Asotin County before turning west at the northern boundary of Asotin County. The Snake River heads west along the northern boundaries of Asotin, Garfield, and Columbia counties before exiting the planning area at the northwest corner of Columbia County. Along the northern county boundaries, the Snake River runs through a series of run-of-the-river dams used to facilitate navigation and produce hydro-electricity.

Water resources for the Snake River can be described by USGS gage No. 13334300 (Snake River near Anatone, Washington), an active instantaneous gage located in the planning area. At this gage, the Snake River drains 92,960 square miles and has an average annual discharge

of 34,520 cfs throughout a 55-year period of record (1958 to 2013) (USGS 2014a). This gage is located near the upstream extent of the planning area, with Grande Ronde River being the only major tributary from the planning area draining into the Snake River upstream of USGS gage No. 13334300.

The Middle Snake River watershed has administrative restrictions known as Surface Water Source Limitations, which limit usage of surface water sources in the watershed, including groundwater connected to surface sources. These limitations are set to protect instream flow values, including water for fish and other aquatic species. Usually this requires that new water uses are curtailed during low-flow periods (Ecology 2012).

Other major waterbodies drain into the Snake River, including the Grande Ronde River, Asotin Creek, and Tucannon River. Associated tributaries for each of these waterbodies eventually drain to the Snake River within the planning area. The Grande Ronde River and Asotin Creek generally drain northeast, toward the eastern boundary of Asotin County, where they drain into the Snake River. The Tucannon River generally drains northwest, toward the northwestern corner of Columbia County, where it drains into the Snake River.

The Touchet River and Mill Creek, as well as their tributaries, are located in the Walla Walla River basin. They generally flow westward toward the Walla Walla River located outside of the planning area.

Several USGS and Ecology gages are available that describe surface water resources for these waterbodies and tributaries. Water resources for specific waterbodies are described in more detail in the Draft Shoreline Determination for Asotin, Columbia, and Garfield Counties Memorandum (Anchor QEA 2014a).

4.8.2 Surface Water Quality

Surface water quality in the planning area is generally affected by climate, dam and hydropower operations, past and current industrial use, and agricultural runoff. These impacts have caused several waterbodies to be impaired by temperature, dissolved oxygen, pH, bacteria, and/or other pollutants.

Multiple waterbodies throughout the planning area are on the 303(d) list of impaired waterbodies requiring a total maximum daily load (TMDL), and several waterbodies are waters of concern on Ecology's 305(b) rating system. TMDL programs are actively implemented in the Snake River (for total dissolved gas), and TMDL programs have been approved by the U.S. Environmental Protection Agency (USEPA) for Pataha Creek (for ammonia-N, BOD, and chlorine) and the Tucannon River and Pataha Creek system (for temperature).

Several Ecology water quality monitoring stations are located in the planning area, including two long-term stations (No. 35A150, Snake River at Interstate Bridge; No. 35B060, Tucannon River at Powers) that are sampled monthly every year.

Surface water quality exceedances are further described for specific waterbodies in Section 5 and Appendix A.

4.8.3 Floodplain and Floodway

Within the planning area, floodways have been identified for portions of the Tucannon River (near Town of Starbuck), Asotin Creek (near the City of Asotin), Grande Ronde River (near its mouth), Touchet River (near the City of Dayton, including North Fork and South Fork), and Patit Creek (near the City of Dayton). For those waterbodies classified as shorelines, the presence of a delineated floodway causes the shoreline jurisdiction area to be increased (where needed) to include the entire floodway and any adjacent 100-year floodplain up to 200 feet landward from the floodway edge.

In addition to the floodway areas, FEMA 100-year floodplain mapping is available in digital format for the entire planning area. Floodplains are delineated for most streams in the planning area. The most recent floodplain mapping updates completed within the planning area became effective in 2000 in portions of Columbia County. The City of Pomeroy in Garfield County had a map update become effective in 1993. Effective dates for other areas within the planning area range from 1977 to 1988, although several local areas have been amended by Letter of Map Changes but not full Flood Insurance Rate Map updates.

The SE WA Coalition has not elected at this time to include the 100-year floodplain as a determining boundary for shoreline jurisdiction.

4.8.4 Channel Migration Zone

The CMZ is the area along a river within which the channels can be reasonably predicted to migrate as a result of natural and normally occurring hydrological and related processes when considered with the characteristics of the river and its surroundings (WAC 173-26-020). These areas adjacent to a stream or river are susceptible to future erosion (Rapp and Abbe 2003). CMZs were delineated for the shoreline extents in Columbia, Garfield and Asotin counties. As part of SMP development process, the location of the general CMZ was identified for these shoreline areas (see map folio in Appendix G). CMZs may require implementation of regulations that are unique to these areas due to the migration potential of a given stream throughout its extents.

The CMZs were delineated in a GIS database and are presented graphically in the map folio included in Appendix G for the Shorelines jurisdiction's rivers and streams. Associated text is also provided in the Reach Tables included in Appendices A through F. The CMZs represent the existing and potential locations the stream channels may occupy within their valleys.

The CMZ delineations are based on the professional judgment of a geomorphologist (Jennifer Goldsmith in Anchor QEA's Seattle office) using visual observation of various physical characteristics that indicate evidence of past channel migration. Analysis included review of existing geology, geomorphology, infrastructure, channel confinement, valley width, topography, estimated hydraulic energy, vegetation, soils, and floodplain and wetland extents. Physical characteristics for the CMZ-delineated streams were reviewed in the GIS for the shoreline jurisdiction areas along the applicable streams and rivers. Each stream was evaluated along its entire shoreline jurisdiction length, and a CMZ line was delineated along each bank depending on the conditions present.

At the time of this analysis, Light Image Detection and Ranging (LiDAR) coverage was not available for the stream extents included in the shoreline jurisdiction, except for the Tucannon River where coverage was available to approximately the Columbia/Garfield County line. Aerial photography was generally limited to recent aerial photos for most shorelines jurisdiction areas in the SE WA region.

4.8.4.1 Disconnected Migration Areas

In addition, disconnected migration areas (DMAs) were identified throughout the CMZ. WAC 173-26-221 allows exclusions of areas where a legally existing, publicly maintained artificial structure is likely to restrain channel migration, and is built above or constructed to remain intact, with appropriate functionality maintenance activities, through the 100-year flood. Identified DMAs include bridge crossings (applicable county, state, and federal crossings) and railroad alignments that meet these criteria. The CMZ is also delineated at each DMA bridge crossing; therefore, if the status of a DMA bridge changes to a non-DMA structure, the corresponding CMZ delineation is provided for that location.

4.8.5 Groundwater Resources

In general, availability and yield of groundwater from bedrock in the planning area is limited by climate and geology. Additionally, groundwater aquifers within SE Washington are in decline (Ecology 2012).

A report was completed in 2008 describing the hydrogeology of the Asotin and Alpowa Creek subbasins located in the eastern portion of the planning area. Generally, groundwater supplies tapped by water wells are located in the shallow and intermediate basalt hydrostratigraphic units. These units are reported to be hydrologically connected to surface water in upper basin areas and may be hydrologically connected to surface water in lower basin areas. Deep basalt hydrostratigraphic units in the basin have far fewer well taps and also likely have limited hydrologic connection with surface water (HDR and GSI 2008)

4.9 Geologic Hazards

Geologically hazardous areas are defined as those lands susceptible to erosion, landslides, seismic, or mine hazard events. Surficial geologic conditions are shown on Map 4 in the

map folio (Appendix G). Primary geologic hazards are soils susceptible to erosion and landslides or rock fall areas. Seismic hazards and mine sites are secondary geologic hazards that generally present less of a concern in most areas. Table 25 summarizes each of the hazards that may be associated with the shorelines of the SE WA Coalition, as well as the sources of information that were evaluated.

Table 25
Geologic Hazards of the SE WA Counties

Hazard	Description	Summary			Source
		Asotin	Columbia	Garfield	
Erosion[1]	Soil units susceptible to erosion by wind, water, and unstable slopes.	Approximately 29.36% (2,588 acres)	Approximately 8.76% (903 acres)	Approximately 18.81% (1,223 acres)	NRCS Soil Survey Geographic (SSURGO) database for Asotin County Area
Landslides[2]	Steep slopes underlain by weak, fine, and unstable geology	Approximately 11.50% (1,014 acres)	Approximately 14.15% (1,459 acres)	Approximately 4.59% (299 acres)	USGS 7.5-minute (10-meter) DEMs 1998, Surface Geology Polygon, 100k Scale (DNR)
Seismic Hazards	Active faults	No known faults in Asotin County	An active concealed fault (Hite Fault) runs diagonally from SW corner to NW corner of Columbia County	An active visible fault (Central Ferry fault) found in Snake River Reach 5	Active fault GIS data (DNR)
	Earthquake locations	No known registered earthquake in Asotin County	One registered earthquake with a magnitude of 3 occurred in 1976 near Tucannon River SR 2c	No known registered earthquake in Garfield County	Earthquake locations GIS data (DNR)

Hazard	Description	Summary			Source
		Asotin	Columbia	Garfield	
Mine Sites [3]	Active (permitted) mine sites	3 sand or gravel mine sites were identified	6 rock or stone mine sites were identified	7 mine sites were identified; 6 were for rock or stone and 1 was for sand or gravel	Mining and Energy Resources GIS data (DNR) 2004, 2010, 2011, and 2012

Notes:
1 Shoreline jurisdiction areas that contain soils classified as having moderate to severe susceptibility to erosion. Many of these soil units are associated with loess deposits, outburst floods, mass-wasting deposits, and thin soils overlying bedrock.
2 Shoreline jurisdiction areas that have slopes greater than 15% and underlain by unstable geology (dunes, alluvial deposits, loess, flood deposits, Columbia River Basalts, sedimentary deposits, and mass-wasting deposits).
3 Underground mining practices are currently not taking place in the County. There are no known inactive mines sites; however, if they exist, these areas may present slope hazards.
DEMS = Digital Elevation Models
DNR = Washington State Department of Natural Resources
GIS = Geographic Information System
k = kilometer
NRCS = Natural Resources Conservation Service
SR = subreach
SSURGO = Soil Survey Geographic Database
USGS = U.S. Geological Survey

4.10 Cultural Resources

The counties of Asotin, Columbia, and Garfield are the Southern Plateau culture area, which is bounded by the Okanogan Highlands to the north, the Bitterroot Mountains to the east, the Cascade Mountains to the west, and the Deschutes and John Day River drainages to the south (Ames et al. 1998). The Southern Plateau Culture area forms part of the larger Columbia Plateau culture area. The prehistory and history of the Southern Plateau is briefly summarized here. Known archaeological and historical sites are discussed, as well as the potential for archaeological and historical sites.

4.10.1 Historical Background

The oldest archaeological sites in the Southern Plateau date to the end of the Pleistocene, when hunters of large mammals fanned out across North America. The earliest Paleoindian sites in the area are attributed to the Clovis culture, including the Ritchey-Roberts Clovis

cache in East Wenatchee, which dates to 12,250 before present (BP; Mehringer and Foit 1990). Clovis sites are rare across the region.

After the brief but widespread Clovis occupation, a broad-spectrum, hunter-gatherer culture developed in the region and persisted until the middle Holocene, around 5,300 years ago. Sites dating to this time period are generally limited to lithic assemblages (basalt projectile points and flake tools) and lack evidence of long-term habitation (Ames et al. 1998).

A shift toward more permanent settlement began around 6,000 years ago and initiated a period that lasted until the beginning of the early Holocene, which was around 3,000 years ago (Chatters and Pokotylo 1998; Ames et al. 1998). In general, tool assemblages are characterized by the addition of groundstone and bone/antler tools to the existing flaked stone technology. The appearance of woodworking tools correlates with the first semi-subterranean structures.

The use of storage features in late Holocene cultures allowed for permanent winter villages and the assemblage of items by individuals, which created differences in equality. This shift began around 4,000 years ago and persisted until historic contact (Chatters and Pokotylo 1998). In the southern Plateau, this period also included evidence of intensive camas processing and fiber and wood artifacts preserved in the relatively dry climate (Ames et al. 1998). The late Holocene archaeological cultures correlate with historic ethnographic descriptions.

Asotin, Columbia, and Garfield counties are located within the traditional territories of the Palouse, Nez Perce, Walla Walla, Cayuse, and Umatilla tribes, Plateau communities who speak dialects of the Sahaptin language (Schuster 1998; Ruby and Brown 1986). Sahaptin peoples practiced an annual subsistence round, traveling from large winter villages to fish camps in the spring, uplands for hunting and plant-gathering in the summer and early fall, and fish camps again in the fall for late runs (Schuster 1998). Fishing was "the primary means of livelihood and survival for Tribal members" (CTUIR 2014). Winter village structures included pit houses and mat lodges, some housing multiple families (Sprague 1998). Inter- and intra-regional trade was an important activity and cultural value (CTUIR 2014).

The first documented Euroamerican explorers, Lewis and Clark, passed through the area in 1805 (Hayes 2011), but the first non-native settlement did not occur until more than 50 years later. Early Euroamerican settlement in the 1860s and 1870s was sparse, impermanent, and centered on gold prospecting (Dougherty 2006a). By the late 1800s, agricultural settlement had begun in all three counties. All three remain primarily rural and agricultural.

4.10.1.1 Asotin County

Asotin County is in the traditional territory of the Nez Perce and Palouse tribes, and modern highways still parallel the historic Nez Perce trail (Sprague 1998; Suljic 2013). The two tribes historically "joined forces for hunting bison in the plains, and visited all of the important fishing centers" (Sprague 1998). The Nez Perce were known for their extensive trade networks, horsemanship, and hunting prowess (Ruby and Brown 1986). The Nez Perce signed the 1855 Nez Perce Treaty, but soon lost most of their reservation when gold was discovered on it in 1860 (Ruby and Brown 1986). Today Nez Perce and Palouse peoples reside on the Nez Perce, Colville, Yakima, and Umatilla reservations, as well as other eastern Washington and Oregon reservations and elsewhere (Sprague 1998).

The first recorded Euroamerican settler in the Asotin County area arrived in 1866, though by that time there was already significant traffic through the area for mining and timber exploration (Lyman 1918). Agriculture, timber, and mining continued to draw Euroamerican settlers to the area through the last half of the 19th century. Asotin County was created in 1883 from the eastern portion of Garfield County, with Asotin (platted in 1880 and 1881) as the county seat (Dougherty 2006a). Agriculture was successful in the area, especially after the construction of irrigation infrastructure in the 1890s. The area was agricultural and very rural until the 1970s. With the creation of Lower Granite Dam and Lake, the City of Clarkston became a port city, and economic activity in the county shifted to include port-related trade (Suljic 2013).

4.10.1.2 City of Clarkston

The City of Clarkston is located at the historically and culturally significant confluence of the Snake and Clearwater rivers. The community was formerly at or near the Nez Perce

village of Alpowa, which was visited by Lewis and Clark in 1805 and 1806 (Hayes 2011). Euroamerican settlers in the 1890s named the area Jawbone Flat; it was renamed Concord in 1897 and Clarkston in 1900 (Arksey 2011). Settlement was sparse until a reliable irrigation system was constructed in 1906 and hydro-electric power supplied in 1907 (Dougherty 2006a; Arksey 2011). The first bridge across the Snake River between the City of Clarkston and nearby (and larger) Lewiston, Idaho, opened in 1915 with streetcar service. In 1939, it was replaced by the four-lane vehicle bridge that still stands today. The construction of the system of dams and locks on the Snake River in the 1970s allowed for the movement of containerized shipping up the river, transforming the City of Clarkston into a bustling port city (Arksey 2011).

4.10.1.3 Columbia County

Columbia County is in the traditional territory of the Cayuse and Palouse tribes, who had close ties with the Nez Perce, Walla Walla, and Umatilla tribes (Sprague 1998). The tribes were distinct culturally and linguistically, but formed strategic alliances for trade, warfare, and resource procurement. Today the Cayuse Tribe is part of the Confederated Tribes of the Umatilla Indian Reservation in Oregon, and the Nez Perce Tribe has the Nez Perce Reservation in Idaho. Cayuse and Nez Perce people also live on other reservations and elsewhere.

Lewis and Clark passed through the area in 1805, and it soon became part of the fur trade circuit; the British Hudson's Bay Company operated in the region in the early 1800s (Dougherty 2006b). Permanent settlers arrived in the late 1850s, and within 20 years census records show almost 7,000 residents in the county, several thousand more than are currently listed (Dougherty 2006b). Garfield County was carved out of Columbia County in 1881 and Asotin County from Garfield in 1883 (Dougherty 2006c). Agriculture and logging were the primary industries throughout the 19th and 20th centuries. Agriculture included growing and processing of crops such as wheat, peas, and asparagus. Moonshine contributed to the county's economy in the 1920s. Columbia County once hosted one of the largest vegetable canneries in the United States, which operated until 2005 (Dougherty 2006b). Though recreational opportunities opened up with the construction of dams on the Snake River in the 1970s, agriculture is still the primary industry in Columbia County.

4.10.1.4 Town of Starbuck

The Town of Starbuck was founded as a railroad town; it was named for W.H. Starbuck, an official with the Oregon Railroad and Navigation Company (part of the Union Pacific Railroad) (Laubaugh 2014; Dougherty 2006a). The town was platted in 1894 and was a rail division point until the construction of the High Line Bridge in 1914 across the Snake River diverted a significant proportion of the rail traffic (Dougherty 2006b). Despite this decrease, the rail line through the Town of Starbuck was used to serve construction of the major dam projects on the Columbia and Snake rivers (Laubaugh 2014). The town has experienced a general decline in industry and population in the 20th century. 761 residents were listed in the 1910 U.S. Census, but only 129 residents were listed a century later. The primary local industry is agriculture.

4.10.1.5 Garfield County

Like neighboring Columbia County, Garfield County is in the traditional territory of the Cayuse and Palouse tribes; generally, Palouse territory is in the northern portion of the county and Cayuse in the southern portion (Sprague 1998; Stern 1998). The Nez Perce Trail crosses the county near the City of Pomeroy; modern U.S. 12 follows its route in the eastern portion of the county. Lewis and Clark passed through the region in 1805 and 1806, but it was not settled by Euroamericans until the 1870s (Hayes 2011; Dougherty 2006c). The Town of Columbia Center, no longer in existence, was the first settlement platted in Garfield County in 1876 (Lyman 1918). Garfield County was created from Columbia County in 1881. Several years of jostling over which town would be the county seat ended in 1884 when the U.S. Congress declared Pomeroy the county seat (Lyman 1918; Dougherty 2006c). The Oregon Railroad and Navigation Company rail line through the Town of Starbuck extended to Pomeroy in 1886, resulting in growth in the agricultural sector through the 20th century (Laubaugh 2014; Dougherty 2006c). Agriculture and related activities were, and remain, the primary industries in Garfield County. Despite steady (if slow) growth, the county is the least-populated in Washington.

4.10.2 Recorded Cultural and Historical Resources

Recorded cultural and historical resources fall into two categories—archaeological sites and the built environment. Archaeological sites may be prehistoric or historic, and include habitation sites, artifact scatters, campsites, cairns, rockshelters, pictographs, petroglyphs, irrigation ditches, mine shafts, homesteads, and other site types. The built environment includes standing structures such as homes, barns, commercial buildings, bridges, and dams.

4.10.2.1 Asotin County

The Department of Archaeology and Historic Preservation (DAHP) lists approximately 360 archaeological sites in Asotin County (counts are approximate because some records are duplicated or missing, and some sites have been recorded but no longer exist). Many of these are located along the banks of the Snake River and Grand Ronde River. Of the sites, most (approximately 248) are pre-contact lithic sites, cairns, rockshelters, pictographs, petroglyphs, or camps. Around 80 sites are historic, generally related to homesteading and agriculture. Eight pre-contact village sites are listed, as well as 24 burials. The Snake River Archaeological District, a National Register of Historic Places (NRHP) eligible district, is located along the Snake River in Asotin County. It includes "97 seasonal campsites, 27 housepits, 44 burials, 23 storage shelters, and 17 additional sites which contain pictographs, petroglyph fish walls, storage pits and sweat lodges" (Welch 1976).

Seventeen properties in Asotin County are listed in the NRHP. Those that appear to be in the shoreline jurisdiction include the Grand Ronde River Bridge of State Route 129 and the Indian Timothy Memorial Bridge of U.S. 12. The Snake River Bridge of U.S. 12 is potentially eligible. There are 646 other structures that are older than 50 years and may also be NRHP-eligible, but have not been evaluated.

4.10.2.2 City of Clarkston

Two archaeological sites are located within the shoreline jurisdiction in the City of Clarkston; one is a pre-contact village site and the other a historic public recreation site (the Chestnut Beach site). Other sites likely exist but have not been recorded. Chief Timothy's grave, 45AS295, is located in Beachview Park.

None of the NRHP-listed historic structures in the City of Clarkston are within the shoreline jurisdiction. However, there are dozens of structures older than 50 years, some of which may be within the shoreline jurisdiction. Most have not been evaluated for NRHP-eligibility, but should be considered potentially eligible.

4.10.2.3 Columbia County

There are approximately 305 recorded archaeological sites in Columbia County. As in Asotin County, most of the recorded sites are pre-contact campsites, cairns, lithic scatters, pictographs, petroglyphs, and rockshelters (approximately 150 sites). There are also many historic homesteads, debris scatters, roads, rail grades, and other historic sites (approximately 115), one recorded village site, and twelve burial sites. The balance of sites has pre-contact and historic components. Many of the sites are located along the Snake, Tucannon, and Touchet rivers (although many are also within the Umatilla National Forest).

Thirty-two properties in Columbia County are listed in the NRHP. At least one, the Snake River Bridge at Lyon's Ferry, is in the shoreline jurisdiction. There are 758 other structures that are old enough to be potentially NRHP-eligible, but have not been evaluated.

4.10.2.4 Town of Starbuck

There are two recorded cultural resources in the Town of Starbuck, though neither are in the shoreline jurisdiction. There is one recorded archaeological site, the Starbuck Railroad Yard (Reference No. 45CO347). The Bank of Starbuck is NRHP-listed. Two other properties have been identified as 50 years old or older, but have not been evaluated.

4.10.2.5 Garfield County

There are approximately 387 recorded archaeological sites in Garfield County. Of these, about 280 are pre-contact sites, including campsites, cairns, lithic scatters, pictographs, petroglyphs, and rockshelters. About 78 are historic sites, 15 are burials, one is a village site, and the balance has pre-contact and historic components. Most of the sites are either along the Snake, Tucannon, or Touchet rivers, or in Umatilla National Forest. One site, a pictograph location (NRHP 45GA115) at or near the Lower Granite Dam, may not be

present. The NRHP nomination form includes records of numerous artifacts found nearby along the Snake River (Beale 1971).

In addition to the pictograph site, there are seven other properties listed on the NRHP. None appear to be within the shoreline jurisdiction. There are 190 structures that are 50 years old or older, but have not been evaluated for NRHP eligibility.

4.10.3 Potential for Archaeological and Historic Resources

Given the history of Asotin, Columbia, and Garfield Counties from the late Pleistocene to the present, the following archaeological and historical site types could be expected:

- Lithic scatters, quarries, and caches
- Pre-contact habitation sites (camps, villages, and cave sites)
- Resource procurement sites (fish traps and hearths)
- Pictographs and petroglyphs
- Historic habitation sites (homesteads, farms, cabins, and railroad laborer camps)
- Historic agricultural infrastructure
- Historic and pre-contact transportation corridors (trails , routes, railroad grades, and road grades)
- Historic public works infrastructure (dams and transmission corridors)

Some sites may be on or near the surface and others may be deeply buried, depending on the localized geomorphology. Human remains are also found in archaeological sites in the region. The richness of the Snake River Archaeological District demonstrates the density and significance of archaeological materials that may be present in the shoreline area. The long human history and strong tribal ties to the land also indicate that the potential for Traditional Cultural Properties and Native American ethnographic landscapes should be considered.

4.10.4 Cultural Resources and Shoreline Development

State and local cultural resources laws apply to shoreline development. State laws include RCW 27.53 (Archaeological Sites and Records), which prohibits the unpermitted removal of

archaeological materials and establishes a permitting process, as well as RCW 27.44 (Indian Graves and Records), which describes how human remains must be treated.

Given the importance of shoreline locations throughout the human history of Asotin, Columbia, and Garfield counties, the potential for cultural resources should be considered high for any shoreline development permit unless demonstrated otherwise. Because the probability of unrecorded resources is high, applicants should be prepared to follow the provisions of RCW 27.53 and 27.44 if cultural resources are identified or encountered during the planning or construction process.

5 SHORELINE ANALYSIS AND CHARACTERIZATION

5.1 Ecosystem-wide Processes and Conditions

An ecosystem is a natural system consisting of biological (i.e., plants, animals, and microorganisms), physical, and chemical factors that together make up the environment. Ecosystem-wide processes are defined in WAC 173-26-020(14) as "the suite of naturally occurring physical and geologic processes of erosion, transport, and deposition; and specific chemical processes that shape landforms within a specific shoreline ecosystem and determine both the types of habitat and the associated ecological functions." Processes occur at multiple scales and are influenced by hydrology, geology, topography, soils, land cover, and land use characteristics. These processes determine the types and quality of shoreline functions or services that contribute to the maintenance of aquatic and terrestrial environments that make up an ecosystem (WAC 173-26-020(13)).

The following sections discuss ecosystem processes and habitat structures that these processes form and maintain. This section also describes current conditions, including alterations to the ecosystem processes. Alterations to ecosystem processes can affect habitat structure and the availability of habitat services, especially over long periods of time. Ecosystem processes and conditions in the SE WA region are presented through the categories of hydrology, sediment, water quality, and habitat.

5.1.1 Hydrology

The process of water delivery, movement, and storage within an ecosystem is largely affected by landform, geology, soil characteristics, and climate, including precipitation. Rain and snowmelt provide the hydrologic inputs into a watershed. This cycle affects other physical, chemical, and biological functions of the river system. The speed with which water flows through the watershed also affects whether nutrients, sediments, or other materials are deposited or retained in the water and transported through the watershed.

Water is delivered to streams primarily from surface water runoff from above and, in some cases, from groundwater. The horizontal structure of river and stream channels includes the wetted channel zone, where water is present during low-flow events, an active channel that is seasonally inundated, and the riparian zone located above seasonal high water elevations.

The vertical structure of these systems includes a benthic zone along the surface of the bottom substrate and the hyporheic zone, which provides a transition between the surface and the groundwater, or phreatic zone. Hyporheic and benthic zones cycle out excessive nutrients and contaminants, store and transport both water and sediment, maintain base flows, and can support vegetation and microorganism communities. The interaction of hydrologic and geomorphic processes contributes to habitat structures useful to aquatic species, including shallow-water and off-channel refugia, gravel bars, pools, riffles, and the transport of organic material, including large woody debris (LWD).

5.1.2 Sediment

Sediment delivery through a watershed is based on interactions between gravity, wind, and water across the various geologic features, soils, and land covers. Landslides and mass wasting are a function of slope, soil, and water interacting to create instability. Soil erosion is a function of slope, soil cohesiveness, and ground cover interacting with water or wind forces. Sediments transported by water or wind are deposited wherever and whenever the water or wind transporting them slows. As the size of sediment increases, the water or wind force required to transport the sediment increases, so smaller sediment is able to travel farther than larger sediment when the transporting forces decrease. This often occurs within topographic depressions, where sediment is deposited into lakes and stream pools, wetlands, and floodplains. The sediment erosion, transport, and deposition cycle is a major aspect of river and stream channel formation and channel migration.

5.1.3 Water Quality

The combined processes that deliver, transport, and store water and sediment in the ecosystem have a substantial impact on water quality. Impacts to water quality occur through land cover changes and development; chemical use in manufacturing, agriculture, and recreation; pathogens from waste; temperature; and natural processes such as plant respiration.

Human-induced changes to water quality (e.g., industrial effluents, sewer overflows, and runoff from upland areas) can alter river and lake water temperatures, turbidity, and oxygen content, as well as nutrient, toxin, and pathogen concentrations (Karr 1995; Welch and

Lindell 2000). In general, these changes can affect the presence, abundance, and vitality of all aquatic organisms. Water delivery and water quality is affected by soil loss, soil compaction, and road and building construction typically associated with development and urbanization. These activities increase the amount of impervious surface (e.g., parking lots and roads), reduce the percolation of precipitation into the ground, and concentrate pollutants into stormwater discharge areas. Reduced water infiltration increases the amount and rate of surface water runoff, causing high stream discharge or high direct delivery of water to the stream and lake shorelines (Dunne and Leopold 1978; Arnold and Gibbons 1996; Poff et al. 1997).

Fertilizers, pesticides, and automobile- and boat-generated pollutants are linked to runoff-borne pollution that enters streams and lakes. Toxins from these and other human-induced changes previously described can settle in river pools, contaminating the sediments of the benthic zone. This leads to toxins either directly affecting benthic species through illness and mortality, or indirectly affecting aquatic and terrestrial species through bio-accumulation from animals lower on the food chain.

Many pathogenic protozoa, bacteria, and viruses can be found naturally in the environment, some of which occur as a result of fecal wastes deposited by animals. These come from fecal material of wildlife and domesticated animals deposited within upland areas that drain into aquatic ecosystems or deposited directly into them (Sherer et al. 1992; Stanley et al. 2005). A higher concentration of domesticated livestock, such as livestock farms or concentrated animal feeding operations, can increase the potential of fecal material draining to shoreline areas. Eutrophication can occur as a response to increased levels of nutrients or natural substances being drained into receiving waterbodies. This can result in plant and algal blooms affecting the levels of dissolved oxygen within the waterbody.

Solar energy input can be another important factor that impacts water quality, especially in the summer when high temperatures coincide with high nutrient loads from agricultural runoff and lower river flows. This can result in high water temperatures and very low levels of dissolved oxygen, both of which can alter the ecology of rivers and streams. Water temperature, a physical characteristic, affects the chemical process of breaking down organic

material into nutrients, as well as the biological processes of phytoplankton and zooplankton reproduction and the metabolism of fish species.

Water temperatures, plant respiration, and biological decomposition are also inversely related to dissolved-oxygen levels, which play a critical role in supporting aquatic organisms such as salmonids. Similarly, alkalinity/pH and nutrient concentrations influence biological processes, particularly phytoplankton production.

5.1.4 Habitat

This section describes general aquatic and terrestrial habitat processes and the conditions and stressors that may affect the functions provided by these habitats in the SE WA region, focusing on habitat types such as aquatic, riparian, shrub-steppe, and functions such as foraging, breeding/nesting and migration elements for terrestrial species; and spawning, rearing, and migration requirements for aquatic species.

5.1.4.1 Habitat Structures

This section describes the conditions and functions of aquatic and terrestrial habitat found in the SE WA region, focusing on freshwater aquatic, riparian, shrub-steppe, and grassland habitats, and habitat functions such as foraging, breeding/nesting and migration elements for terrestrial species; and spawning, rearing, and migration requirements for aquatic species. This section will also identify stressors that may affect the functions provided by these habitats and opportunities for conservation or restoration of these functions. Section 5.2 describes specific characteristics and conditions of habitats associated with the waterbodies that are included under shoreline jurisdiction for this SE WA Coalition SMP update.

Habitat is the natural environment in which particular species or populations have adapted to live. Habitat provides the physical conditions and biological functions needed to support the species as part of a larger ecosystem. The lifecycles of aquatic, avian, and terrestrial species are often interdependent, meaning that the habitat requirements of a single species include other species on which they depend. The habitat requirements vary for different species and can vary for different life stages of a species.

Habitat is often described in terms of the functions of reproduction, forage, and shelter (Morrison 1992):

- The reproduction needs of species vary greatly. All species have specific needs for areas to find a mate, reproduce, and successfully rear offspring (often referred to as breeding sites, birthing areas, and nest sites). Some species have very specific needs; for example, amphibians (e.g., frogs, toads, and salamanders) require water or moist areas for laying eggs and for larval development.
- Forage includes water and food sources. Water is a universal need of all species, while forage needs vary greatly by species. An important consideration is whether a species is prey or a predator. Predators obviously require that the habitat needs for prey species are met.
- Shelter includes areas for safe resting, refuge or cover from predators, and shelter from environmental hazards (e.g., daytime or nighttime temperatures, extreme weather events, seasonal climate fluctuations, and unpredictable disturbances such as drought, fire, or flooding).

5.1.4.1.1 Aquatic Habitat

General Processes

Characteristics of healthy aquatic habitat vary based on waterbody type (i.e., ocean, lake, or stream), stream channel type, stream size, water source and type, and location. This section discusses aquatic habitat conditions and functions generally found in the SE WA region waterways.

Some of the important ecosystem features applicable to determining the health of freshwater aquatic habitat in the SE WA region include water quality (including presence of contaminants as well as water temperature), water depth, substrate size, migration access, floodplain health, instream cover (such as large rocks and woody debris), and the extent of aquatic and riparian vegetation. In smaller stream systems, such as the numerous creeks under shoreline jurisdiction in southern Garfield and Columbia Counties, healthy aquatic habitat may be characterized by presence of larger rocky cobbles and gravel substrates on the channel bed and minimal amounts of aquatic vegetation due to the high water velocity. Larger riverine systems with lower water velocity, such as the Snake River, may be

characterized by finer substrates, higher turbidity levels, and more significant aquatic vegetation in the shallow waters along the shoreline.

Water quality constraints such as low dissolved-oxygen conditions, very low alkalinity, elevated temperature, or high turbidity conditions (also see Section 5.1.3) may affect the ability of aquatic habitat to support native fish species such as salmonids. Water depth in aquatic freshwater habitat is a key factor in determining the suitability of habitat to various species and life stages. Waterways that have artificially hardened shorelines may have less shallow water habitat and therefore may not provide suitable function for migrating and rearing juvenile fish species. Floodplain habitat availability is required for many fish species during multiple life stages. Extensive and unaltered floodplains that are accessible to fish species are ideal.

In-stream cover increases the structural complexity of aquatic habitat through presence of overhanging vegetation, LWD, or larger natural rock outcrops that improve the habitat quality for most fish. Aquatic vegetation, similar to in-stream cover, can improve habitat as long as the amount of aquatic vegetation does not create a low dissolved-oxygen issue; in general, native aquatic vegetation provides important habitat conditions while introduced species such as Eurasian watermilfoil *(Myriophyllum spicatum)* does not. Riparian vegetation stabilizes banks, may provide shading that reduces summer water temperatures, provides nutrients through leaf debris and insect fall, and provides in-stream cover through tree-fall.

Modifications to multiple habitat functions may combine to impact aquatic habitat in other ways. Instream cover, presence of riparian vegetation, and human alteration of shorelines each affect the quality and intensity of available light energy in freshwater systems. Light energy affects water temperature, animal behavior (such as the relationship between predators and prey), and plant photosynthesis and growth (Tilzer et al. 1975). Natural light is altered when riparian vegetation is removed and when structures such as docks are built that create large expanses of artificial shade and prevent natural light from reaching the water. Reductions in this natural light preclude plant colonization and growth beneath these structures and can cause changes in animal behavior. Natural light can also be reduced by the presence of algal blooms caused by excess nutrient additions that can collect in slack

water areas. Artificial light from the presence of shoreline development can also affect nocturnal predator-prey relationships.

Southeast Washington Conditions

This section summarizes ecosystem processes and conditions in the SE WA region. See Section 5.3 for waterbody-specific descriptions through the categories of hydrology, sediment, water quality, and habitat for the main waterbodies and their associated tributaries.

Within the SE WA region, land use is closely linked with water use including dams and irrigation diversions. The lower Snake River has four hydropower dams: Ice Harbor Dam, Lower Monumental Dam, Little Goose Dam, and Lower Granite Dam. Of these, Little Goose and Lower Granite dams are located within the SE WA Region. These dams, along with the Hells Canyon Dam (outside of the SE WA region), impact water quality and water flows within the SE WA region, which in turn affect the ability of aquatic habitat to support functions of rearing, migration and spawning for fish species, including ESA-listed salmonids (spring Chinook, steelhead, and bull trout; see Section 5.1.4.1.2, Table 28).

In addition, the SE WA region includes the Starbuck Dam on the Tucannon River, which is operated by the Starbuck Power Company and used to divert irrigation waters, and Headgate Dam on Asotin Creek (no longer an active diversion), which is owned by Asotin County. There is a dam on the Touchet River in Dayton. Although Dayton is conducting their SMP update process separately, it impacts the water flows upstream and downstream of the site. In addition to impacting water quantity and flows, all the dams on these waterways present fish passage barriers that have in some cases been partially ameliorated.

Many floodplains in the SE WA region have been impacted by channelization to reduce flooding and by conversion to agricultural and residential uses (SRSRB 2011). Flood-control structures have been constructed on a number of streams and rivers, including the Touchet and Tucannon rivers and Asotin Creek. These waterbodies have accelerated surface water runoff and decreased groundwater recharge, contributing to lower summer stream flows in these rivers and creeks. Road construction, overgrazing, and removal of vegetation in

floodplain areas have also caused bank erosion, resulting in wide channels that increase the severity of low summer flows and associated high water temperatures (SRSRB 2011).

In summary, the watersheds within shoreline jurisdiction in the SE WA region have similar salmonid habitat limitations due to similarities in topography, geology, vegetation, and land use. Agriculture, grazing, logging, and development have impacted water quality through increased sediment loads and elevated water temperatures, decreased riparian condition, and caused major changes in channel form and function as a result of channelization and flood-control measures. Restoration actions that address the limiting factors common among each watershed (lack of LWD, stream confinement, reduced riparian functions, increased sediment, reduction in quality habitat [lack of pools and reduced habitat diversity], alterations to stream flows, and elevated water temperatures) would support recovery of aquatic habitat within SE WA watersheds (SRSRB 2011).

5.1.4.1.2 Terrestrial Habitat

General Processes

Terrestrial habitat may consist of many patches of interconnected habitat types. Within SE WA Coalition counties, the terrestrial habitat within and adjacent to the shoreline zone includes riparian, shrub-steppe, grasslands and rangelands, agricultural lands, and forested areas. This section discusses general characteristics of those terrestrial habitat types relative to their status in SE Washington. These terrestrial habitats provide functions to support wildlife habitat and movement corridors, fire suppression, cultural and recreational values and services, forest products, and human food supplies produced by crops and livestock.

Terrestrial wildlife utilizes the variety of habitats through movement corridors. Terrestrial movement corridors are crucial to wildlife and may be seasonal, depending on the species. The primary function of a corridor is to connect different habitat areas to facilitate migration and dispersal between the areas. Movement corridors provide the following functions essential to healthy wildlife populations:

- Provides connectivity and, thereby, genetic variation and biodiversity between differing populations and habitats, connects isolated habitats, and may allow recolonization of extirpated species

- Provides varying habitats for migration patterns (e.g., foraging, mating and nesting, rearing, shelter, and wintering) and allows populations to move in response to habitat changes such as fires
- Can provide habitat for "corridor dwellers," i.e., species that live within corridors for extended periods (Beier and Loe 1992)

The riparian habitat zone along a river, stream, or lake shore is an essential movement corridor for terrestrial species, and a healthy riparian zone can also support the health of the adjacent aquatic habitat and may be especially important in shrub-steppe regions. Habitat characteristics of healthy riparian areas include a connected corridor for wildlife travel, vegetation types adapted to wetter soils, occasional flooding, and natural disturbance regimes. Vegetation in the riparian zone within arid and semi-arid regions tends to be unique in comparison to riparian zones other regions of the United States, and these areas have stronger changes in character between riparian and upland zones (Malanson 1993, as cited in Buffler 2005). Riparian areas in arid lands offer important functions for species that inhabit the shrub-steppe, species more limited in range to the riparian zone, and species that inhabit the adjacent aquatic habitat (Anchor QEA 2013).

For shrub-steppe and arid land species, riparian habitat provides access to a critical water source and often provides a more productive environment for forage, escape, thermal cover, nesting sites, and critical winter habitat (Anchor QEA 2013). Riparian areas typically support larger flocks and a greater density of upland birds than shrub-steppe or grassland habitat because of the greater production of biomass and the more complex mosaic of vegetation (Stinson and Schroeder 2012). Riparian zones within forested areas of the Blue Mountains within the SE WA Coalition counties have been described as having the following characteristics in common: 1) they create well-defined habitat zones within the much drier surrounding areas; 2) they make up a minor portion of the overall area; 3) they are generally more productive in terms of biomass (plant and animal) than the remainder of the area; and 4) they are a critical source of diversity within the forest ecosystem (Childs 2002).

Healthy riparian habitat supports a healthy freshwater aquatic habitat through the presence of complex vegetation communities that overhang the shoreline from the uplands. This

overhanging vegetation provides cover and refugia to fish and other aquatic species from extreme conditions (e.g., high flows and high temperatures); supports insects that serve as prey for freshwater species; and provides leaf litter and LWD, which are integral components to freshwater ecosystems in terms of nutrient cycling and habitat complexity. Management of stream and river hydrology for irrigation and other activities can significantly influence riparian habitats and the terrestrial plant and wildlife species that occupy them.

Land-use changes and land use activities can have a wide-spread impact on the functions provided by riparian terrestrial habitat. The removal of native riparian vegetation, the introduction and proliferation of invasive plant species, and the filling or degradation of wetlands along shorelines impact the organic inputs that fuel production of the lower levels of the food chain and, therefore, can have impacts throughout the entire food web. Organic matter produced by these habitats supports terrestrial and aquatic insects and other organisms that are then eaten by birds, juvenile salmonids, and other fish species. Cattle grazing leads to loss of riparian vegetation, and, in time, the loss of riparian vegetation associated with cattle grazing will lead to erosion and steepening of the riverbank and alteration of the hydrologic regime (Naiman et al. 2005).

Irrigated agricultural lands may provide greater productivity of certain types of biomass compared to habitat with native shrub-steppe vegetation. Irrigated pasture, for example, produces much higher biomass than native shrub-steppe in arid areas and, therefore, may provide greater potential forage for certain species. Such agricultural areas may also displace native species because their specific lifecycle needs are not met. Agriculture also may change the predator and prey community that affects native species. Agricultural landscapes typically support much higher rodent populations; in turn, this larger population supports higher populations of predators, such as raptors, that also support native species. This artificially higher population of predators may substantially change the balance between native species and introduced species more adapted to human alternation (Dunn 1978; Moulton et al. 2006).

Public road shoulders and right-of-ways are a significant contributor and/or routing network of fine sediment (SRSRB 2011). Projects that address the following may result in significant

improvements to habitat within the SE WA terrestrial system within the shoreline jurisdiction:

- Prior allocation of ground and surface water
- Catastrophic wildfire
- Improperly designed, installed, and maintained roads and road right-of-ways as they pertain to sediment
- Impervious surface and storm water runoff
- Invasive riparian weeds and competition

Finally, human development of urban and residential areas introduced artificial night-time lighting associated with roads, parking lots, industrial complexes (including dams), houses, docks, piers, and sports fields. This artificial light can interfere with aquatic and terrestrial animals' routines, change predator-prey relationships, and interfere with plant production and animal behavior.

Southeast Washington Conditions

An abundant and diverse community of priority wildlife species inhabits and utilizes shrub-steppe and riparian areas in SE WA counties and, to a lesser extent, the developed lands and agricultural areas. Historically, cougar *(Puma concolor),* black bear *(Ursus americanus),* and gray wolves *(Canis lupus)* were top-level predators in the area, preying primarily on deer and elk. Although black bears are present in the foothills and mountains, and sometimes in the lower valleys and riparian areas, gray wolves are not currently known to reside or den in the SE WA area (WDFW 2014a). However, individuals of the Wenaha and Walla Walla packs in the Northeastern Oregon Blue Mountains may cross into SE Washington, and unconfirmed wolf sightings have been reported in Asotin and Columbia counties (WDFW 2014a; WDFW 2014b). Cougar numbers diminished to very low levels in the 1960s, but have rebounded, with healthy populations found within the Blue Mountains (ODFW 2006). In the absence of a balanced number of natural predators including wolves, large mammals such as deer and elk have increased substantially, often in excess of the land's carrying capacity (WDFW 2011).

Shrub-steppe habitat in the SE WA region is characterized by associations of sagebrush species and bunchgrasses, the combinations of which vary based on predominant precipitation rates, slope and soil types (Daubenmire 1970). Much of the shrub-steppe habitat in Washington is characterized by the Wyoming big sagebrush/bluebunch wheatgrass *(Artemisia tridentata wyomingensis/Pseudoroegneria spicata*) shrub-steppe habitat type (Daubenmire 1970; Dunwiddie and Camp 2013). Large tracts of shrub-steppe habitat are diminishing in Washington due to ongoing habitat fragmentation and conversion, and have been identified by WDFW as priority habitats (WDFW 2013). Some estimates show available shrub-steppe habitat in the Columbia basin has been reduced by as much as 50% from historical conditions. Several species of birds and mammals are known to only use large, undisturbed tracts of habitat, including the sage sparrow *(Amphispiza belli)*, Brewer's sparrow *(Spizella breweri)*, sage trasher *(Oreoscoptes mantanus)*, sage grouse *(Centrocercus urophasianus)*, black-tailed jackrabbit *(Lepus californicus)*, and other species.

Irrigated agricultural lands in the valleys of the SE WA region rely significantly upon water from tributaries to the Snake River such as the Tucannon and Touchet rivers and Asotin Creek, but upland agriculture is dominated by non-irrigated farming (APUD 2005). The agricultural lands of the SE WA region were developed through conversion of large amounts of shrub-steppe habitats but also included conversion of grasslands, forests, wetlands, and riparian habitat (WDFW 2013). The irrigated lands are primarily utilized for pasture and orchards, with some irrigated crops grown in Columbia County (APUD 2005).

Overall, the availability of water in the semi-arid ecosystem is typically a major limiting factor for the diversity and abundance of terrestrial plant and wildlife species within riparian habitats (Anchor QEA 2013). Common native riparian plant species in the SE WA region, including species endemic to the riparian areas of the SE WA region, are identified in Table 27. Cheatgrass, reed canary grass, and scotch thistle are common non-native riparian species found adjacent to waterways and other areas throughout eastern Washington, including the SE WA region.

Table 27
Dominant Native Riparian Species in SE WA Counties

Common Plant Name	Scientific Plant Name
Alder	*Alnus* spp.
Black cottonwood	*Populus balsamifera*
buttercups*	*Ranunculus* spp.
Chicory	*Chicorium intybus*
Chokecherry	*Prunus virginiana*
Common mullien	*Verbascum thapsus*
Cottonwoods	*Populus* spp.
Douglas hawthorn	*Crataegus douglasii*
Douglas-fir	*Psuedotsuga menziesii*
Douglas' clover*	*Trifolium douglasii*
Englemann spruce	*Picea engelmannii*
Few-flowered spike rush	*Eleocharis pauciflora*
Golden willow	*Salix alba*
Grand fir	*Abies grandis*
Kentucky bluegrass	*Poa pratensis*
Locust	*Robinia* spp.
Oregon bolandra*	*Bolandra oregana*
Milk-vetch species*	*Astragalus* spp.
Ponderosa pine	*Pinus ponderosa*
Red-osier dogwood	*Cornus stolonifera*
Rose	*Rosa* spp.
Rushes	*Juncus* spp.
Sedges	*Carex* spp.
Snake Canyon desert-parsley*	*Lomatium serpentinum*
Snowberry	*Symphoricarpus albus*
Sticky currant	*Ribes viscosissimum*
Western larch	*Larix occidentalis*
White alder	*Alnus rhombifolia*
Willows	*Salix spp.*

Note:
* Indicates riparian species on WDNR's Natural Heritage List; may occur but no longer common.

An abundant and diverse community of priority wildlife species inhabits and utilizes shrub-steppe and riparian areas in the SE WA region and, to a lesser extent, the developed lands and agricultural areas. The fish and wildlife species in the SE WA region are identified in Table 28.

Table 28

ESA-listed Fish Species and Washington State Priority Species in SE WA Counties

Species Category	Species Name[1]		Status		Asotin	Columbia	Garfield
	Common Name	Scientific Name	State	Federal			
Fishes	Bull Trout/Dolly Varden	*Salvelinus confluentus/Salvelinus malma*	Candidate*	Threatened*	✓	✓	✓
	Chinook Salmon	*Oncorhynchus tshawytscha*	Candidate	Threatened[2]	✓	✓	✓
	Leopard Dace	*Rhinichthys falcatus*	Candidate		✓	✓	✓
	Margined Sculpin	*Cottus marginatus*	Sensitive	Species of Concern	▪	✓	▪
	Mountain Sucker	*Catostomus platyrhynchus*	Candidate		✓	✓	✓
	Pacific Lamprey	*Lampetra tridentata*		Species of Concern	✓	✓	✓
	Rainbow Trout/Steelhead/Inland Redband Trout	*Oncorhynchus mykiss*	Candidate**	Threatened**	✓	✓	✓
	River Lamprey	*Petromyzontiformes*	Candidate	Species of Concern	✓	✓	✓
	Sockeye Salmon	*Oncorhynchus nerka*	Candidate	Threatened[3] Endangered[4]	✓	✓	✓
	Westslope Cutthroat	*Oncorhynchus clarki lewisi*			✓	✓	✓
	White Sturgeon	*Acipenser transmontanus*			✓	✓	✓
Amphibians	Columbia Spotted Frog	*Rana luteiventris*	Candidate		✓	✓	✓
	Rocky Mountain Tailed Frog	*Ascaphus montanus*	Candidate	Species of Concern	✓	✓	✓
	Western Toad	*Anaxyrus boreas*	Candidate	Species of Concern	✓	✓	✓
Reptiles	Sagebrush Lizard	*Sceloporus graciosus*	Candidate	Species of Concern	✓	✓	✓
Birds	Bald Eagle	*Haliaeetus leucocephalus*	Sensitive	Species of Concern	✓	✓	✓
	Black-backed Woodpecker	*Picoides arcticus*	Candidate		✓	✓	✓
	Burrowing Owl	*Athene cunicularia*	Candidate	Species of Concern	✓	✓	✓

Species Category	Species Name[1]		Status		Asotin	Columbia	Garfield
	Common Name	Scientific Name	State	Federal			
	Chukar	*Alectoris chukar*			✓	✓	✓
	Clark's Grebe	*Aechmophorus clarkii*	Candidate		▪	▪	✓
	Dusky Grouse	*Dendragapus obscurus*			✓	✓	✓
	E WA breeding occurrences of: Phalaropes, Stilts and Avocets	*Phalaropus, Himantopus, and Recurvirostra*			✓	✓	✓
	Ferruginous Hawk	*Buteo regalis*	Threatened	Species of Concern	▪	✓	✓
	Flammulated Owl	*Otus flammeolus*	Candidate		✓	✓	✓
	Golden Eagle	*Aquila chrysaetos*	Candidate		✓	✓	✓
	Great Blue Heron	*Ardea herodias*			✓	✓	✓
	Lewis' Woodpecker	*Melanerpes lewis*	Candidate		✓	✓	✓
	Mountain Quail	*Oreortyx pictus*			✓	✓	✓
	Northern Goshawk	*Accipiter gentilis*	Candidate	Species of Concern	✓	✓	✓
	Peregrine Falcon	*Falco peregrinus*	Sensitive	Species of Concern	✓	✓	✓
	Pileated Woodpecker	*Dryocopus pileatus*	Candidate		✓	✓	✓
	Prairie Falcon	*Falco mexicanus*			✓	✓	✓
	Ring-necked Pheasant	*Phasianus colchicus*			✓	✓	✓
	Sage Thrasher	*Oreoscoptes montanus*	Candidate		✓	▪	✓
	Upland Sandpiper	*Bartramia longicauda*	Endangered		✓	✓	✓
	Vaux's Swift	*Chaetura vauxi*	Candidate		✓	✓	✓
	Waterfowl Concentrations	*Anatidae*			✓	✓	✓
	Western grebe	*Aechmophorus occidentalis*			✓	▪	▪
	White-headed Woodpecker	*Picoides albolarvatus*	Candidate		✓	✓	✓
Mammals	Wild Turkey	*Meleagris gallopavo*			✓	✓	✓
	Bighorn Sheep	*Ovis canadensis*			✓	✓	✓
	Black-tailed Jackrabbit	*Lepus californicus*	Candidate		▪	✓	✓

Species Category	Species Name[1]		Status		Asotin	Columbia	Garfield
	Common Name	Scientific Name	State	Federal			
	Elk	*Cervus canadensis*			✓	✓	✓
	Gray Wolf	*Canis lupus*	Endangered	Endangered	✓	✓	✓
	Marten	*Martes americana*			✓	✓	✓
	Merriam's Shrew	*Sorex merriami*	Candidate		✓	✓	✓
	Northwest White-tailed Deer	*Odocoileus virginianus ochrourus*			✓	✓	✓
	Preble's Shrew	*Sorex preblei*			✓	✓	✓
	Rocky Mountain Mule Deer	*Odocoileus hemionus hemionus*	Candidate	Species of Concern	▪	✓	✓
	Roosting Concentrations of: Big-brown Bat, Myotis bats, Pallid Bat	*Antrozous pallidus*			✓	✓	✓
	Townsend's Big-eared Bat	*Corynorhinus townsendii*	Candidate	Species of Concern	✓	✓	✓
	Washington Ground Squirrel	*Urocitellus washingtoni*	Candidate	Candidate	▪	✓	▪
	White-tailed Jackrabbit	*Lepus townsendii*	Candidate		▪	✓	✓
Invertebrates	California Floater	*Anodonta californiensis*	Candidate	Species of Concern	▪	▪	✓
	Columbia Pebblesnail	*Fluminicola columbiana*	Candidate		✓	▪	✓
	Columbia River Tiger Beetle	*Cicindela columbica*	Candidate		✓	▪	▪
	Giant Columbia River Limpet	*Fisherola nuttalli*	Candidate		✓	✓	✓
	Juniper Hairstreak	*Callophrys gryneus/ Mitoura grynea barryi*	Candidate		✓	✓	✓
	Mann's Mollusk-eating Ground Beetle	*Scaphinotus mannii*	Candidate		✓	▪	▪
	Poplar Oregonian	*Cryptomastix populi*	Candidate		✓	▪	▪
	Shepard's Parnassian	*Parnassius clodius shepardi*	Candidate		✓	▪	▪

Notes:
* Bull trout only
** Steelhead only

1 These are the species identified for Asotin, Columbia, and Garfield counties. This list of species was developed using the distribution maps found in the Priority Habitat and Species (PHS) List (see http://wdfw.wa.gov/conservation/phs/).
2 Upper Columbia Spring run is endangered.
3 Threatened in Ozette Lake.
4 Endangered in Snake River.

5.2 Waterbody-specific Processes and Conditions

This section describes processes and conditions, including alterations to the ecosystem process, for the shorelines within the SE WA region. Alterations to ecosystem processes can affect habitat structure and the availability of habitat services, especially over long periods of time. Ecosystem processes and conditions in the SE WA region are presented through the categories of hydrology, sediment, water quality, and habitat for the main waterbodies and their associated tributaries.

5.2.1 Asotin Creek and Associated Tributaries

5.2.1.1 Hydrology

Hydrology for waterbodies in the Asotin Creek drainage area follow a typical snow-melt dominated flow pattern where peak flows occur in late spring and the lowest flows occur in late summer (SRSRB 2012). Some areas in the lower basin of these waterbodies are used agriculturally, which may have impacts on area hydrology.

USGS operates two active gages in the area: one (No. 13334450; Asotin Creek below Confluence, near Asotin, Washington) has been active for 12 years (USGS 2014b), and the other (No. 13335050; Asotin Creek at Asotin, Washington) has been active for 22 years (USGS 2014c). Other USGS gages were active previously, and daily flow data have been collected in this area since Water Year 1929. Gage data show that Asotin Creek flows at Asotin range from 527 cfs in late spring to 24 cfs in late summer, with a 97 cfs mean annual flow.

Ecology currently operates one gage (No. 35D100; Asotin Creek above George Creek), which has been in service since 2005, and two other gages have been historically active (Ecology 2014a).

5.2.1.2 Sediment

Fine sediment in the Asotin Creek basin is relatively low compared to similar streams. Substrates are generally dominated by gravels and cobbles. Cobble embeddedness has decreased in recent years; changes in upland agricultural practices are thought to have

decreased erosion and therefore reduced fine sediment loads that cause cobble to become and remain embedded. In general, sediment is increased compared to pre-European settlement conditions, primarily due to upland farming practices. Prior to European settlement, natural sources of sediment were typically caused by hillslope failure and debris flow (Eco Logical Research 2008).

5.2.1.3 Water Quality

Waterbodies in this group are impaired by high temperatures throughout the drainage area. Several streams are listed on the 303(d) list as requiring TMDLs for temperature. Some areas may be impacted by agricultural land use, and the temperature issues are likely caused by natural climate conditions as well as lack of shade.

5.2.1.4 Habitat

5.2.1.4.1 Aquatic Habitat

The Asotin Creek basin supports ESA-listed salmonids identified in Table 28. The aquatic habitat has been designated critical habitat for steelhead, bull trout, and spring Chinook salmon, and it has been designated by WDFW as a wild steelhead refuge (WDFW 2014c).

Natural flow regimes exist in North Fork Asotin Creek, South Fork Asotin Creek, and George Creek, while Asotin Creek is managed by the Headwater Dam (SRSRB 2011). George Creek and its main tributary, Pintler Creek, form the largest subbasin of Asotin Creek (ACCD 2004). The upper reaches of these streams are perennial, but during summer and fall months George Creek usually has no surface flow connection to Asotin Creek (ACCD 1995). The North Fork Asotin Creek and its main tributaries are also perennial, while the South Fork Asotin Creek flows year-round (ACCD 2004); however, it should be noted that George Creek, like some other perennial streams in the Middle Snake watershed, has been identified as a good example of an intermittent stream being able to produce a significant steelhead population (Ullman and Barber 2009). While the system is water-limited, the steelhead population has been described as strong, and the focus on improvements should be on restoration of habitat rather than improved flows (Ullman and Barber 2009).

The aquatic habitat in North Fork and South Fork Asotin Creek and George Creek has been affected to some degree by a combination of logging and vegetation clearing resulting in reduced riparian vegetation and erosion; development of infrastructure, including levees and roads, resulting in restriction of floodplain access and riparian habitat; grazing of native grasslands and riparian vegetation by domesticated animals; and sediment loading from agricultural development and other land-development activities.

As a result of these human alterations, limiting factors within the Asotin Creek watershed include high stream temperatures, lack of refugia, lack of habitat complexity and LWD, sedimentation in spawning gravels, and contaminants, including high fecal coliform levels (ACCD 1995). The Asotin Subbasin Plan (2004) identified areas with the highest restoration value in the Asotin Subbasin (ACCD 2004). The following areas were identified that occur within the SMP jurisdiction: Upper Asotin (Headgate Dam to Forks), Lower George Creek, Lower North Fork Asotin Creek, and Lower South Fork Asotin Creek. The key limiting factors for these priority aquatic habitat areas for steelhead and spring Chinook included the following: sediment, LWD, pools, riparian function, stream confinement, summer water temperature, bedscour, and flow. Flow was identified as a primary limiting factor only in the Lower George Creek geographic area. Priority protection geographic areas for aquatic salmonid species include all geographic areas identified for restoration plus the Upper North Fork Asotin Creek, Upper South Fork Asotin Creek, Upper George Creek, North Fork Asotin tributaries, and the Headwater (upper ends of George Creek, Charley Creek, North Fork Asotin Creek, and South Fork Asotin Creek) (ACCD 2004).

5.2.1.4.2 Terrestrial Habitat

The percentage of lands operated under different land use systems has been generally consistent since the 1990s, when it was estimated that 26% of the terrestrial habitat in the Asotin Creek watershed was in agricultural use, and 43% was in range or pastureland, and 30% forested lands (ACCD 1995 and 2004). Within the Asotin Creek basin, forested lands typically occupy north-facing slopes of canyons, with rangeland dominating the south-facing slopes, and farmlands, wetlands, and riparian areas found in the floodplain valleys of Asotin Creek, North Fork Asotin Creek, South Fork Asotin Creek, and George Creek.

Forested areas within the shoreline management jurisdiction are mainly in the upper reaches of North Fork Asotin Creek in the Umatilla National Forest. The forest begins at the 22- to 24-inch precipitation zone, with Douglas-fir dominating and ponderosa (bull) pine, grand (white) fir and western larch (tamarack) also present (ACCD 1995). At lower elevations western red cedar, Engelmann spruce, and grand fir are found in areas of deeper soils that hold more water.

Forested riparian vegetation along upper Asotin Creek, and the North Fork and South Fork Asotin Creek remains in transition, having been affected by flooding events in 1996 and 1997 that reduced the canopy cover by approximately half compared to pre-flood (1993) surveys (SRSRB 2011). Douglas fir and grand fir remain the successional dominants in older stands, with alder and ponderosa pine also present (SRSRB 2011). Understory shrubs typical of forested riparian habitat include red-osier dogwood and willows (NRCS 2001). Herbaceous understory growth in the system is consistent with disturbance in the riparian communities, and cheatgrass, Kentucky bluegrass, mullein, chicory, and Scotch thistle are among the most frequently encountered species (SRSRB 2011).

Studies and assessments document that within the lower Asotin Creek basin, riparian vegetation is a mixture of mature alders, young cottonwood, willow, and sparse immature conifers in the mid to lower reaches (SRSRB 2011; ACCD 1995). Coyote willow, red-osier dogwood and western clematis were common shrub species, with the understory comprised of reed canary grass (non-native), hardstem bullrush, and horsetail (ACCD 1995). In the lower reaches of Asotin Creek, as the creek flows through the steep canyon, the riparian vegetation forms a narrow strip adjacent to shrub-steppe or grassland vegetation or irrigated croplands and pastures. The rare, ESA-threatened Spalding's catchfly *(Silene spaldingii)* is found in Asotin County and may occur in the Asotin Creek or George Creek areas. Spalding's catchfly grows in deep loamy soils and moist sites such as northern slopes, swales, or other small landscape features, and is found on a wide range of slopes, from 0–70%, but most commonly between 20 and 40% (USFWS 2011). Spalding's catchfly is commonly found among bunchgrass grasslands, characterized by either Idaho fescue *(Festuca idahoensis)* or by both bluebunch wheatgrass *(F. idahoensis* and *Pseudoroegneria spicata)* in Idaho, Oregon, and Washington, but may also occur in shrub-steppe and forested habitats (USFWS 2011).

Most of the cropland in Asotin County is classified by USDA as highly erodible lands, and as such, farmers producing commodity crops must implement measures to control erosion, such as terracing and strip cropping (ACCD 1995). However, farming of these highly erodible lands, even with erosion-prevention measures in place, likely increases sediment contribution to the Asotin Creek system (ACCD 1995).

5.2.2 Grande Ronde River and Associated Tributary

5.2.2.1 Hydrology

Most flow volume in the Grande Ronde River and Joseph Creek stems from outside the planning area, specifically, from drainage located in the State of Oregon. Surface flows generally follow a hydrologic pattern typically seen in snowpack-dominated watersheds, where peak flows are in the spring during snowmelt when temperatures begin to rise, and low flows are in the late summer, when little precipitation occurs and snowpack is not present. Flow data show that Grande Ronde River at Troy flows range from 13,820 cfs in late spring to 409 cfs in late summer, with a 3,027 cfs mean annual flow. Additional information from the Ecology gage operated on Joseph Creek from 2003 to 2012 is provided in the IAC reach table for Joseph Creek.

5.2.2.2 Sediment

Sediment from the Grande Ronde River and Joseph Creek within the planning area is generally caused by transport from upstream areas outside of the planning area. Within the planning area, high sediment loads likely caused by tributary reaches impact the Grande Ronde River and Joseph Creek (HDR-EES 2005). Upstream of the planning area, the Grande Ronde River had a TMDL completed for sedimentation (USEPA 2014).

5.2.2.3 Water Quality

The Grande Ronde River and Joseph Creek are not listed on the Ecology 305(b) ratings; however, upstream of the planning area (in the State of Oregon) the Grande Ronde River is impaired from temperature, sedimentation, dissolved oxygen, and eutrophication. TMDLs have been completed for the Grande Ronde River for temperature (USEPA 2014).

Upstream of the planning area there is significant agricultural activity that may impact water quality. Within the planning area there is little activity, so water quality would likely be more related to climate and natural impacts than anthropogenic causes.

5.2.2.4 Habitat

5.2.2.4.1 Aquatic Habitat

Irrigation withdrawals in the Oregon portion of the Grande Ronde River have reduced flows in Washington, but natural flow regimes appear to be present on Joseph Creek, and irrigation withdrawals do not appear to influence the system (SRSRB 2011). The Grande Ronde and Joseph Creek systems support ESA salmonids listed in Table 28.

The lower Grande Ronde River and Joseph Creek areas within Asotin County have been identified as a priority for restoration due to habitat limiting factors for steelhead and Chinook (HDR-EES 2005). For the Grande Ronde, these factors include reduced habitat diversity, high sediment loads, high temperatures, and reduced habitat quantity; other habitat limitations were listed as low summer flows, pathogens, competition with hatchery fish, and predation (HDR-EES 2005).

In Joseph Creek, the limited aquatic habitat quantity for juvenile salmonid rearing is linked to adjacent roads along the banks. Substrates have been identified as limiting factors for incubation life history stages due to the reduction in availability of suitable gravels (HDR-EES 2005). Water quantity and flow are not typical limiting factors for steelhead in this area, as there are few dams and irrigation diversions; rather, it appears that high water temperatures, poor riparian buffers with eroding banks in the lower reaches, and competing fish species appear to significantly impact steelhead numbers (Ullman and Barber 2009). The subbasin plan for the Grande Ronde concluded that the sediment and other impacts affecting this area likely are caused by activities upstream, and therefore that actions taken strictly within lower Joseph Creek are unlikely to improve conditions appreciably (SRSRB 2011).

The Grande Ronde Subbasin Plan (Nowak 2004) attributed the lack of habitat diversity in the lower Grande Ronde mainstem primarily to anthropogenic confinement, the importation of suspended sediment from upstream, and a lack of LWD. Much of the Grande Ronde

operates as a natural transport zone due to a high degree of natural confinement, so the system is unlikely to require or accommodate increased woody debris loading (Nowak 2004). Sediment and temperature issues in the tributaries are likely attributable to riparian degradation associated with streamside roads and grazing (Nowak 2004). The lower Grande Ronde River has benefited from salmon habitat restoration actions performed in the drainage, which reduced sediment load, removed obstructions, and improved riparian habitat in the tributaries; in addition, federal and state programs were implemented to improve grazing practices, convert tilled lands to minimum-till agriculture, fenced livestock out of sensitive habitats, constructed sediment retention basins in problem areas, and installed off-channel water sources to livestock (SRSRB 2011).

5.2.2.4.2 Terrestrial Habitat

There is little of the Grande Ronde Basin within Asotin County that has not been in some way affected by human use activities such as agricultural use, cattle grazing and watering, infrastructure development, logging, and forest management. In agricultural areas along the Grande Ronde, the riparian areas are more highly impacted. In many portions of the river, there may be no riparian vegetation at all, or, where present, invasive species are likely to be abundant due to the proximity to agricultural sources of weed seeds (Grande Ronde Water Quality Committee 2000).

The reach of the Grande Ronde River within Asotin County is conveyed within a narrow channel that broadens in some subreaches and as it flows through lower elevations. In general, the channel floodplain is narrow. The riparian vegetation community in the upper reaches is less disturbed by human activities but is very sparse given the terrain and geology of the steeply sloped cliffs and bluffs. Grasses and a few small shrubs dominate the riparian vegetation along the Grande Ronde River mainstem within Washington; the limited tree canopy consists of occasional conifers. In lower elevations trees like black cottonwood, Douglass fir, white alder, peachleaf willow, narrowleaf cottonwood, ponderosa pine, and grand fir are common in the riparian zone, as well as shrubs like red osier dogwood, western birch, black hawthorn *(Crataegus douglasii)*, rocky mountain maple, Lewis' mockorange *(Philadelphus lewisii)*, and Net-leaf hackberry *(Celtis reticulata)* (Stewart 2007). The rare Spalding's catchfly is found in Asotin County, and it may also occur in the Grande Ronde

area (USFWS 2011). In general, the riparian cover along fish-bearing tributaries to the Grande Ronde within Washington is relatively sparse; for example, Joseph Creek has a narrow buffer of deciduous trees about 20 to 30 feet in height (SRSRB 2011).

Grande Ronde Road runs along the north bank of the river from the Oregon state line to the State Route 129 bridge, and Shumaker Road, Snake River Road, Rogersburg Road, and other less formal gravel roads continue for much of the remaining reach on one or both banks. The presence of roads further constrains the development of the riparian community through either the physical presence of the infrastructure or the potential disturbance from the additional recreational access the roads provide. Lower Joseph Creek flows through mostly private lands in a relatively confined canyon; the creek is partly paralleled by a road and exhibits similar riparian constraints.

5.2.3 Snake River

5.2.3.1 Hydrology

The Snake River drains most of the planning area and is the largest water resource within the area. Hydrology is dependent on upstream drainage areas outside of the planning area, as the Snake River drains a large area upstream of the planning area in Oregon and Idaho, as well as small portions of the States of Wyoming, Nevada, and Utah. River flow is regulated by several reservoirs located upstream of the planning area, which have a combined storage capacity of 10 million acre-feet. Over 4 million acres of land is irrigated upstream of the planning area, which causes additional impacts to flow coming into the planning area (USGS 2014a). Gage data show that Snake River flows near Anatone range from 134,200 cfs in late spring to 9,765 cfs in late summer, with a 34,520 cfs mean annual flow.

Within the planning area, flows are impacted by out-of-stream uses including irrigation diversions, but they are relatively small compared to the overall flow of the river and upstream impacts. Flows are highest in the spring and lowest in late summer.

5.2.3.2 Sediment

Sediment movement for the Snake River in the planning area is generally limited by in-river dams, specifically Lower Granite Dam, which is the most upstream dam within the planning

area, so a significant amount of sediment is collected within this reservoir and not passed downstream. Sands have increased in proportion of total sediment to the Snake River when comparing 2009–2011 to 1972–1979. Studies suggest that an increase in forest fires from 1980–2010 in upstream areas outside of the planning area have caused an increase in suspended sands. Bedload is not a significant source of total sediment load, as less than 1% of the total sediment load transported to Lower Granite Reservoir consists of bedload (Clark et al. 2013). The Lower Snake River Programmatic Sediment Management Plan was signed by the U.S. Army Corps of Engineers (USACE) in November 2014 and includes measures to address the immediate need to re-establish the federal navigation channel at Ice Harbor Dam as well as at the confluence of the Snake River and Clearwater River, in addition to a longer-term sediment management strategy. Dredging is proposed to begin in 2015 pending the outcome of litigation concerning the USACE determination.

5.2.3.3 Water Quality

The Snake River is impaired by temperature, dissolved oxygen, total dissolved gas, pH, invasive exotic species, and several other pollutants. TMDLs are needed for many portions throughout the Snake River for several impairment causes. TMDLs have been completed for total dissolved gas in the Snake River (USEPA 2014). Climate, lack of cover, hydro-electric generation, and industrial, municipal, and agricultural use likely have an effect on water quality in the Snake River.

Ecology has a long-term water quality monitoring station (No. 35A150) located on the Snake River that has collected data monthly since 1991 (Ecology 2014b).

5.2.3.4 Habitat

5.2.3.4.1 Aquatic Habitat

Aquatic habitat conditions and functions of the Snake River along the northern county lines for Asotin, Garfield and Columbia counties are affected by a variety of stressors discussed in previous sections of this document that affect water quality, water quantity, sedimentation, and other physical processes and human use impacts that combine to influence the condition of aquatic habitat. This section describes the various factors affecting the condition and

function of aquatic habitat of the Snake River, and where concerns exist for particular county segments, those will be specifically noted.

Whether the Snake River's aquatic habitat can provide the full suite of ecological functions is primarily affected by upstream and downstream water management regimes. Hydropower management of the Snake River results in fluctuations in water levels that can impact the quality of the riparian vegetation along the shoreline, among other ecological attributes. These changes may alter how well the Snake River can provide aquatic species rearing, migration, and spawning habitat.

Recreational use, through development of hardened banks and overwater structures, in and along the Snake River may also affect the amount of quality aquatic habitat. In addition, development of both formal and informal access areas along shorelines can disturb riparian vegetation and lead to degradation of aquatic habitat, through impacts to water quality.

Section 5.1.4.1.2 describes some considerations for restoration actions in riparian habitat that could improve conditions of aquatic habitat, and additional restoration planning will be developed as part of the SMP update process.

5.2.3.4.2 Terrestrial Habitat

Kuttel, Jr. (2002) described the riparian vegetation in the Lower and Middle Snake River as including forbs, grasses, sedges, rushes, grazed pasture, and some shrubs and trees. In some areas, the riparian trees are as tall as 30 feet and the buffer as wide as 40 feet, and the riparian areas are extensively grazed (SRSRB 2011). Agricultural and urban or residential development has resulted in loss of shrub-steppe habitat, habitat degradation, and fragmentation along the shorelines of the Snake River along the shorelines of Asotin, Garfield, and Columbia counties.

To varying degrees, aquatic ecosystems of the Snake River are affected by habitat fragmentation due to roads, utility corridors, agricultural and urban development, and irrigation channels affects. Also, dam development has altered the floodplain and riparian habitats along the Snake River within these counties as a result of water regime management,

and disrupted sediment and wood recruitment along the shorelines of the Counties as well as transport within the Snake River basin.

The shrub-steppe habitat is located near the Snake River in large and small tracts adjacent to narrow riparian zones. Common species include bluebunch wheatgrass, hard fescue, and forbs such as balsamroot, northern buckwheat, brittle prickly pear, alum root, and lupine. The region is also characterized by shrubs such as sagebrush, bitterbrush, rabbitbrush, snowberry, greasewood, and service berry. Displacement of shrub-steppe plant species along the Snake River by invasive cheat-grass *(Bromus tectorum)*, Russian thistle *(Salsola tragus)*, and other invasive species has significant impact of the shrub-steppe ecosystem. The invasive plants significantly decrease the shrub-steppe system's fire suppression functions, and the loss of native vegetation in this ecosystem increases fire intensity and frequency. In addition to creating hazards for humans and wildlife, this also further impacts the dominant shrub-steppe plant species big sagebrush *(Artemisia tridentata)*, which in turn, directly impacts rare birds such as the sage grouse and other sagebrush-obligate species (Link et al. 2006).

Moderately disturbed shrub-steppe communities are fairly common in the planning area. Such areas have been affected to various degrees by grazing, invasive species presence and other disturbances. Relatively undisturbed shrub-steppe habitat is dominated by native grasses and sagebrush, with an intact cryptogam crust (i.e., a thin layer of algae, moss and lichen that indicates an undisturbed community), and contains mostly native shrubs (e.g., big sagebrush and bitterbrush) with a predominantly native grass understory. This habitat type, while negatively impacted by grazing, off-road vehicle use, and other disturbances, still provides significant function in terms of cover, food, and nesting habitat for many species of wildlife.

Recommendations that have been proposed by the Snake River Salmon Recovery Board (SRSRB) for limiting impacts and preserving shrub-steppe habitat along the Snake River include limiting development footprints, including agricultural land cover changes; siting additional residential development to minimize the construction of road and utility corridors that may fragment shrub-steppe habitat; restricting vegetation clearing; keeping domestic animals out of sensitive-species habitat; and limiting fencing to avoid barriers to native

wildlife (SRSRB 2011). As part of the SMP update process, a restoration plan will be developed that more specifically identifies potential shrub-steppe restoration opportunities.

The riparian habitat along the Snake River is relatively narrow due to both land use and natural environmental conditions. Tree and shrub vegetation adjacent to the shoreline and overhanging stream banks is necessary for optimally functioning aquatic habitat, and the functions quality provided by herbaceous riparian habitat with no tree or shrub canopy are generally reduced in terms of food web support, thermal regulation, and soil stabilization. Recommendations from the SRSRB (2011) for improving riparian habitat along the Snake River include limiting development footprints including agricultural land cover changes; limiting siting of additional residential development to minimize shoreline impacts; restricting vegetation clearing; controlling and concentrating recreational access; and managing livestock access. As part of the SMP update process, a restoration plan will be developed that more specifically identifies potential riparian restoration opportunities.

Asotin County

The rare Spalding's catchfly is found in Asotin County and may occur along the Snake River area (USFWS 2011).

5.2.4 Forest Service Creek Group

5.2.4.1 Hydrology

Little information regarding hydrology was found about the waterbodies in the Forest Service creek group. No gages are present on these waterbodies, which are located in a wilderness area with little to no disturbances noted. Because these waterbodies drain relatively high-elevation areas with little to no disturbances, it is reasonable that hydrology would likely follow a snowmelt-dominated hydrologic cycle where flows are highest in the late spring and lowest in the late summer.

5.2.4.2 Sediment

Little information was found about the waterbodies in this group. In general, sediment processes are expected to be limited by supply, and sediment is expected to transport

efficiently during extreme flow events due to relatively steep slopes and undisturbed vegetated soils throughout the area.

5.2.4.3 Water Quality

Little information was found about the waterbodies in this group. None of the waterbodies are listed on the Ecology 305(b) ratings for water quality concerns, and they are located in a wilderness area with little to no disturbances noted. It is likely that waterbodies in this group have better water quality relative to other streams in the planning area due to these conditions; however, this cannot be confirmed due to a lack of data.

5.2.4.4 Habitat

Mill Creek

A tributary of the Walla Walla River, Mill Creek originates from a network of streams on the western slopes of the Blue Mountains in Umatilla County, Oregon. Mill Creek is characterized in its upper reaches by abundant riparian vegetation, small to medium cobble substrate, and a strong flow. This portion of the watershed is nearly pristine; it provides critical habitat for ESA-listed steelhead and bull trout and is protected and managed to ensure water quality sufficient for human use. The City of Walla Walla coordinates with the U.S. Forest Service (USFS) to limit access to 36 square miles of the headwaters of Mill Creek, and this protected area provides almost 90% of the City of Walla Walla's water source (City of Walla Walla 2014). The beneficial uses for upper Mill Creek are spawning and rearing, and "extraordinary primary contact" recreation (Ecology 2014c). Dominating tree species include alder, Douglas-fir, and grand fir. The Mill Creek watershed is home to elk, cougar, deer, and black bear. Bird species include grouse, hawks, and songbirds. Mill Creek also provides habitat for other small fish. In contrast to the upper reaches, the lower reaches of Mill Creek near the juncture with the Walla Walla River (and outside of the Columbia County jurisdiction) have been heavily altered primarily due to agriculture, grazing, forestry, flood control structures, and urbanization. It often experiences issues relating to stormwater runoff, inadequate buffer vegetation, erosion, and sedimentation (Ecology 2013).

North Fork Wenaha River

A large tributary of the Wenaha River in the Wenaha-Tucannon Wilderness area, the North Fork Wenaha River is located between Mill Creek to the west and Butte Creek to the east. Alder and scattered conifers comprise the riparian zone along the stream, and small and medium cobble are the dominant substrate. Downstream of the confluence with Deep Saddle Creek, the flow of the North Fork Wenaha River increases substantially due to input from both Deep Saddle Creek and multiple springs. The stream here has a very low gradient containing small to medium cobble, with scattered boulders and low sedimentation. Generally, the Wenaha-Tucannon Wilderness area through which the North Fork Wenaha River flows is home to bald eagles, bears, bighorn sheep, bobcats, moose, elk, mule deer, whitetail, and wild turkey. The North Fork Wenaha River has an average stream width of 4.28 meters with temperatures ranging from 45 to 54 °F and has an average of seven pools per mile (WDFW 2008). The North Fork Wenaha River provides habitat for the federally threatened summer steelhead and bull trout, as well as other small fish (HDR-EES 2005).

Butte Creek

Butte Creek lies between the North Fork Wenaha River and Crooked Creek, and is a relatively large tributary to the Wenaha River located in the northern Wenaha-Tucannon Wilderness area. The creek is characterized by cobble with scattered areas of gravel, woody debris, moderate sedimentation, a fairly low gradient, and a good riparian buffer dominated by alder and Douglas-fir. In the portion of the creek that runs through a narrow canyon called Box Canyon, the riparian vegetation shifts from the banks to the surrounding hillsides, gradient is steeper, substrate includes large cobble that create riffle and plunge pools, woody debris is rare, and sedimentation is quite low. Butte Creek has an average temperature of 50 to 52 °F (WDFW 2008) and width-to-depth ratio of 10.4 (WSCC 2002). Depending on the location along the water, the creek is characterized by a healthy combination of riffles, runs, and pools (WDFW 2006). Butte Creek provides habitat for the federally threatened bull trout, both resident and fluvial forms, summer steelhead, as well as other small fish (HDR-EES 2005). Most of the fish remain in the upper mainstem and in the West Fork Butte Creek, up to the falls (about 0.5 mile).

First Creek and Third Creek

Located east of Butte Creek, First Creek and Third Creek are small creeks that flow through the Wenaha-Tucannon Wilderness area and are tributaries to Crooked Creek. Little empirical information has been generated regarding conditions in these creeks (Nowak 2004). The riparian area is forested with mature and second-growth Douglas-fir, grand fir, and alder along the two streams (WSCC 2002). LWD, spaces between boulders and cobbles, and overhanging vegetation provide instream fish cover on First Creek, and overhanging vegetation and spaces between rocks provide fish cover on Third Creek.

Crooked Creek

Crooked Creek originates within the Wenaha-Tucannon Wilderness area, and drains into the Grande Ronde River just beyond the Oregon border. First Creek and Third Creek are tributaries to Crooked Creek, and the forested riparian area of Crooked Creek is similar in species composition to other creeks within the wilderness area, although the hillsides contain less tree cover due to geologic and climate differences, and Crooked Creek lacks significant riparian canopy cover. Portions of Crooked Creek provide habitat for the federally threatened bull trout, as well as other small fish; a majority of the creek also provides habitat for the federally threatened summer steelhead (HDR-EES 2005). Increased water temperatures and poor substrate conditions as a result of reduced upland forest vegetation may prevent steelhead and bull trout from inhabiting the stream on a regular basis. Crooked Creek has an average width-to-depth ratio of 17.4 (WSCC 2002). Nearby pools are rare.

5.2.5 Touchet River and Associated Tributaries

5.2.5.1 Hydrology

Hydrology in the Touchet River basin is typical of a snowmelt-dominated watershed: the majority of precipitation falls in the form of snow, and peak flows are controlled by snowmelt during spring, while low flows typically occur in late summer (GeoEngineers 2011).

There is one Ecology flow gage (No. 32E050, North Fork Touchet River, above Dayton) located in the planning area; it has been collecting data since 2003. Six Ecology gages were

previously in service within the planning area in the basin (Ecology 2014a), and USGS had two gages within the planning area that were active from the 1940s to 1960s (USGS 2014d).

To determine groundwater influence in streamflows during the low-flow season, low-flow measurements were taken in the Touchet River basin, in August 2002. In the upper areas of the basin, water was generally lost from the stream to groundwater, while in the lower areas of the basin water was gained to the stream from groundwater (Ecology 2007).

5.2.5.2 Sediment

In the Touchet River basin, sediment is produced by delivery from mountains, ridgelines, and plateaus via tributary streams; landslide and debris flow during high runoff periods; and from alluvial sediment storage. Sediment delivery is affected by soil type, vegetation type and coverage, land use, climate, and erosion rates. The upper reaches are generally more supply limited and sediment is transported relatively efficiently compared to the lower reaches (GeoEngineers 2011).

5.2.5.3 Water Quality

Many waterbodies in this group are impaired by temperature, inorganic nitrogen, phosphorus, dissolved oxygen, and pH. TMDLs have been completed for temperature, pH, and dissolved oxygen within the Touchet River basin (USEPA 2014).

The Touchet River has been studied previously to address water quality concerns within the area. In a study that included monitoring nine sites throughout the area during 1999 and 2000, high temperature was found as the main concern, while fecal coliform levels also exceeded Ecology standards. Water quality generally degraded moving from upstream to downstream along the monitoring sites (Krause et al. 2001). Several temperature dataloggers were installed in the Touchet River basin, and the data showed that water temperature standards were consistently exceeded throughout the area, although some of the upper areas of the basin had relatively lower temperatures (Ecology 2007).

5.2.5.4 Habitat

5.2.5.4.1 Aquatic Habitat

Aquatic habitat conditions and functions of the Touchet River, as well as the North Fork, South Fork and Wolf Fork of the river, are affected by a variety of stressors related to water quality, water quantity, sedimentation and embeddedness, and other physical process and human-use impacts (SRSRB 2011). Each fork is fed by numerous small creeks and drainages, and runoff feeding these systems is primarily from snowmelt and precipitation (GeoEngineers 2011).

Because the stream channels of North Fork and Wolf Fork Touchet River in this basin are generally more incised and flow through valleys of narrow basalt canyons, the floodplain is constrained, and riparian habitat is generally confined to narrow bands along the banks of the rivers until the floodplain broadens near Dayton. The South Fork Touchet River valley is much wider, and the channel is less confined and more sinuous, flowing through forested floodplain habitat.

The cool waters and gravel substrates found in the aquatic habitat of the mid-to-upper Touchet River supports salmonids spawning, and salmonids, primarily steelhead, may also rear in the middle and upper reaches. The lower portions of the Touchet River are unsuitable spawning habitat due to water temperatures and lack of suitable substrates. Juvenile steelhead have been identified rearing in the middle and upper reaches of the Touchet River and the North Fork, South Fork, and Wolf Fork Touchet River, but they are mostly excluded from the lower portions of the mainstem Touchet River, because of generally high sediment levels, plus low water flows and high water temperatures during summer (Mendel et al. 2014).

The function of the aquatic habitat of the Touchet River and associated forks is affected by runoff from upland land-use practices, as well as recreational use and access. Aquatic habitat in the Touchet River watershed could be improved through increasing habitat diversity, developing primary pool habitat, addressing sedimentation from runoff, creating more complexity along the shoreline and riparian zone through increased structure and cover, and

developing side-channel, low-velocity refugia areas to offset channelization that has occurred within the watershed (GeoEngineers 2011).

5.2.5.4.2 Terrestrial Habitat

Touchet River basin terrestrial habitat is largely characterized by forested systems in the upper reaches of the North Fork, South Fork, and Wolf Fork Systems, with agricultural and low-density residential development areas increasing as the forks combine to form the mainstem Touchet River near Dayton. Adjacent riparian habitat in the Touchet River watershed has been designated for priority restoration actions to support the recovery of ESA-listed mid-Columbia salmonids (SRSRB 2006; WWBWC 2004).

Agricultural development becomes more predominant in the mid reaches when the floodplain valley opens up and the fork channels are less incised. Grassland and shrubland are common in the lower reaches near the confluence with the Touchet mainstem. Forest vegetation consists primarily of grand fir and Douglas-fir, with ponderosa pine occurring on south and southwest slopes. Common grassland species include Idaho fescue, bluebunch wheatgrass, and Sandberg's bluegrass. Primary shrubland species include snowberry, wild rose, mallow ninebark, and ocean spray, and riparian plant communities include black cottonwood, sitka alder, willow, dogwood, and coniferous species (Childs 2002). Vegetation in the terrestrial system of the South Fork Touchet River has been shaped by decades of fire suppression, extensive timber harvest, and livestock grazing, and these past management practices have altered plant community composition by increasing the occurrence of earlier successional and structural stages (Childs 2002). As with other higher-elevation creeks and rivers within the SE WA Coalition area, predominant vegetation varies based on the orientation of the slopes. In the South Fork Touchet system, a mix of native or mostly native grassland species is common on southern and southwestern-facing slopes (Childs 2002).

Invasive species are an issue within the grasslands of the Touchet Basin, over large expanses of the ridgetops, canyon bottoms, and on steep slopes throughout the basin. Invasive species, including yellow starthistle, have thrived on disturbances to these sites. For example, annual grasses that can be invasive, e.g., ventenata, medusahead, and bromes, dominate the

vegetation of South Fork Touchet River, where bluebunch wheatgrass and Idaho fescue were absent or present at less than 5% cover (Childs 2002).

Between the western county line and the city limits of Dayton, the Touchet River flows through land used largely for agricultural purposes. The riparian habitat that remains along both banks consists of large trees that provide a mature canopy in many subreaches. The mainstem Touchet is confined along the right bank by a levee, and the river channel is primarily a single channel, but has developed high-flow side channels within the riparian zone along the left bank (GeoEngineers 2011). Agricultural land use in the Touchet River watershed consists of dryland and irrigated crops, as well as cattle grazing. Agricultural land use is more common on the upper plateaus and ridgelines surrounding the river valleys, and, as a result, although agricultural land use may not occur within the shoreline jurisdiction in some subreaches, agricultural activities may still influence the terrestrial and aquatic habitat due to runoff patterns and infrastructure.

Development for commercial and residential use is concentrated around the confluence of the North Fork, Wolf Fork and South Fork Touchet River to the mainstem Touchet River, near Dayton. This section does not include significant discussion of conditions within Dayton, as the City is completing a separate SMP update. In the farthest upstream ends of the North Fork, South Fork, and Wolf Fork Touchet River, terrestrial habitat may be used for recreation, forest management, and some timber harvest activities.

Development and agriculture are the primary land uses that have affected terrestrial habitat within the shoreline jurisdiction. These activities result in channel confinement, disconnected floodplains, a lack of side channels and refugia habitat, sedimentation and erosion of stream beds and stream banks, and reduction in the occurrence and availability of LWD (GeoEngineers 2011). Priorities for improvement of terrestrial habitat in the Touchet River watershed include management of land uses that may impact riparian zone and other development within the floodplain (GeoEngineers 2011).

5.2.6 Tucannon River and Associated Tributary

5.2.6.1 Hydrology

Hydrology for the Tucannon River basin has been described in detail in Anchor QEA's *Tucannon River Geomorphic Assessment and Habitat Restoration Study* report (2011). Precipitation depends on elevation; most precipitation at higher elevations occurs as snowfall. Peak flows typically occur from March to June due to melting snowpack; however, an occasional rain-on-snow event from December to February may cause rapid snowmelt and be the period of maximum annual discharge. Such rain-on-snow events are typically shorter in duration than spring peaks (Anchor QEA 2011).

USGS has one active flow gage in the Tucannon River basin (No. 13344500, Tucannon River near Starbuck, Washington), which has a 57-year period of record (USGS 2014e). USGS also has one historical gage (No. 13344000, Tucannon River, near Pomeroy, Washington) that has data from the 1910s and 1920s (USGS 2014d).

Ecology has one active flow gage (No. 35B150, Tucannon River, near Marengo) that has been active since June 2003 (Ecology 2014a). Gage data show that Tucannon River flows near Starbuck range from 1,000 cfs in late spring to 22 cfs in late summer, with a 171 cfs mean annual flow. Additional gage data are reported in the reach tables for the Tucannon River, located in Appendix F.

5.2.6.2 Sediment

In the Tucannon River basin, sediment input is dominated by surface erosion on unvegetated soil, streambank erosion from channel migration, tributary incision, and periodic gullying of swales during extreme rain events. Landslides do not appear to be a dominant erosion process. Sediment input in the basin is dependent on land use, timber harvest, wildfires, and erosion of roads, streambanks, and swales (Anchor QEA 2011).

5.2.6.3 Water Quality

Waterbodies in the Tucannon River basin are impaired by temperature, turbidity, pH, and bacteria. The Tucannon River also currently has TMDLs in place for temperature in several reaches (USEPA 2014). Impacts to water quality in these areas were reported to be caused by

inadequate shade, including removal from flooding, fire, livestock grazing, agriculture, and timber harvesting (Ecology 2010).

Ecology has a long-term water quality monitoring station located on the Tucannon River (No. 35B060) that has collected data monthly since 1978 (except during 1993 and 1994) (Ecology 2014b).

5.2.6.4 Habitat

5.2.6.4.1 Aquatic Habitat

The Tucannon basin has been impacted by agricultural development, forest management regimes, and other development. These activities have increased sediment loading to streams, altered or removed riparian vegetation, and limited the amount and recruitment of LWD and reduced connectivity to the floodplain. Irrigation and water use, both historical and current, have affected base flows in the Tucannon basin, particularly in the lower reaches. Dams, including Starbuck Dam, constructed in the lower reaches adversely affected fish passage, although no barriers have been identified (SRSRB 2006, as cited in Anchor QEA 2011). Due to lack of channel structure, large floods played a detrimental role in shaping the Tucannon River. For example, following the 1996 flood (approximately 5,000 cfs) many river reaches exhibited rapid lateral channel migration resulting in nearly complete loss of riparian habitat. Current issues exist with the ability of the system to clear large wood due to bridges and other constraints, particularly in the Starbuck Reach. Restoration actions have been planned, with some projects being constructed in recent years that can both help to address this risk and improve aquatic habitat conditions.

Recommendations for improving aquatic habitat were made in the 2011 *Tucannon River Geomorphic Assessment and Habitat Restoration Study* (Anchor QEA 2011) and include protecting natural processes throughout the system to allow for natural migration and wood recruitment; reconnecting disconnected habitats such as oxbows, wetlands, side channels; and removing infrastructure impediments such as culverts, levees, and implementing levee setback projects to restore more historic floodplain connections.

5.2.6.4.2 Terrestrial Habitat

The majority of the Tucannon basin downstream of Tumalum Creek is under cultivation in grain crops, while the upper reaches are primarily forested. The valley floor in the lower reach is occupied primarily by livestock pastures and a narrow vegetated riparian buffer. The riparian vegetation along the Tucannon River is made up of mature alders, young cottonwood, willow and sparse immature conifers in the mid to lower reaches and primarily mature cottonwood and conifers in the upper reaches. Tree species present along the streambanks include black cottonwood, white alder, Douglas-fir, grand fir, Douglas hawthorn, and Engleman spruce. Common tree species in the riparian plant community include western larch, ponderosa pine, golden willow, and locust. Common shrub species include chokecherry, coyote willow, wild rose, sticky currant, and snowberry. Few-flowered spike rush, various sedge species, and a variety of weedy forbs are common. In the upper reaches, the riparian area is forested with conifers, although scrub-shrub species dominate steeper south and western facing slopes, and upstream of Panjab Creek, the tree and understory density is significant (SRSRB 2011). A number of large forest fires in the last 10 years have affected the floodplain and riparian corridor community and structure in the upper reaches of the Tucannon River (Anchor QEA 2011).

The channel of the Tucannon River has been straightened through past forest and land-use practices (Anchor QEA 2011). While in many locations the river has been allowed to recover more natural sinuosity, in many reaches the channel is confined by infrastructure such as artificial bank armoring, levees and berms, and roadways. In addition, the floodplain is constrained by naturally occurring features such as bedrock along the valley walls and alluvial fan deposits. The artificial constraints affect the connectivity of the floodplain to the waterway, reduce the riparian vegetation community and recruitment of LWD, and contribute to sedimentation, especially when paired with the presence of natural constraints such as bedrock. Levee setback projects have been recommended to restore historic floodplain connections where feasible (Anchor QEA 2011).

Restoration actions that have been identified for the Tucannon River basin include actions that will restore riparian processes through protection of healthy areas, removal of invasive plants, enhancement of native plants, exclusion of domesticated animals; restoration of complexity through planting in riparian zone, and placement of LWD (Anchor QEA 2011).

5.3 Summary of Ecological Stressors

The watersheds within the SE WA region share similar ecological functions and impairments due to similarities in the physical habitat settings and stressors from land-use practices. Activities such as agriculture, forest practices, infrastructure development (including dams and levees) and residential and urban development have affected riparian conditions, altered channel forms and floodplains, and affected water quality. The SRSRB identified important factors affecting recovery potential of the region, including lack of LWD, stream confinement, reduced riparian function, increased sediment, reduction in aquatic habitat complexity, altered flows, and high water temperatures (SRSRB 2011). Table 29 summarizes the key stressors affecting ecological functions provided by the specific aquatic and terrestrial habitats within shoreline jurisdiction of the waterways within the SE WA region.

Table 29
Key Stressors Affecting Ecological Functions

	Asotin Creek		Grande Ronde River		Snake River		Forest Service Creek Group		Touchet River		Tucannon River	
Key Stressors	**Aquatic**	**Terrestrial**	**Aquatic**	**Terrestrial**	**Aquatic**	**Terrestrial**	**Aquatic**	**Terrestrial**	**Aquatic**	**Terrestrial**	**Aquatic**	**Terrestrial**
Recreational access – existing	-	-	-	-	x	x	-	-	x	x	x	x
Recreational area – potential development	x	x	x	x	x	x	x	x	x	x	x	x
Agricultural use – irrigation	x	x	x	-	x	-	-	-	x	x	x	x
Agricultural use – livestock	x	x	x	-	x	-	-	-	x	x	x	x
Residential development – existing shoreline development	-	-	-	-	-	-	-	-	x	x	x	x
Residential development – land-use change (e.g., development of new roads, utilities)	x	x	x	x	x	x	x	x	x	x	x	x
Residential development – future shoreline development	-	-	-	-	x	x	-	-	x	x	x	x
Hydrologic management regimes	x	x	x	x	x	x	-	-	x	x	x	x

Notes:
x = Stressor present
- = Stressor not present

5.4 Reach Characterizations

Characterization of shoreline reaches and subreaches are provided in Appendix A through F. These Reach Tables summarize existing physical conditions; characterizations and analyses for water quantity and sediment, water quality, and habitat and species; ecological functions analysis, including identifying functional conditions, stressors, and restoration and protection opportunities; preliminary shoreline environment designation considerations; existing public access and potential additional public access opportunities; and cumulative impact considerations.

Each reach was categorized overall in terms of ecosystem function. The categories include functioning, partially functioning, or impaired. The framework, definitions, and categories for this analysis were adapted from a system originally developed for Riparian Area Management guidelines proposed by the U.S. Bureau of Land Management (Prichard 1998). This is a relative assessment with some degree of calibration to reflect the overall conditions found in the SE WA region.

The potential ecological function is defined as the highest ecological status that a shoreline reach can attain given no development or management constraints but which does take into account the extent to which management (particularly water management) supports ecological function.

Ecological function is defined here as the degree of similarity between existing physical and biological conditions, and the potential ecological function of a site; the higher the ecological function, the closer the site is to potential. Potential, for this assessment, encompasses all the resources defined by the interaction of hydrology, vegetation, water quality, and erosion/deposition (soils), and aquatic and riparian habitat. For example, the potential of the hydrologic component includes the concept of a stream channel's physical characteristics (dimension, pattern, and profile) being within a "normal or usual" range (e.g., entrenchment, sinuosity, width, depth, and slope of the bankfull channel) as defined by landform and geomorphic stream type given current flows.

The Reach Tables in Appendix A through F describe ecological function for each reach as either functioning, partially functioning, or impaired, as defined below:

- **Functioning** is a state of resiliency that will allow a shoreline to hold together during high-flow events with a high degree of reliability. This resiliency allows an area to then produce desired values, such as fish habitat, bird habitat, or forage, over time. Riparian-wetland areas that are not functioning properly cannot sustain these values over time and are susceptible to stochastic disturbances such as fire.
- **Partially functioning** is a state in which the ecological function of the shoreline is somewhat compromised by development or management trends, or is particularly susceptible to future degradation due to development, management or ecological conditions. A partially functioning shoreline has some ability to recover through changes in management or the removal of identified stressors on ecological function.
- **Impaired** is a state in which the ecological functions of the shoreline are heavily compromised by development or management of the reach. An impaired reach has a low probability of recovery, through restoration, due to the degree of structural change to the shoreline, waterbody, and surrounding shorelands. Impaired shorelines can be functionally improved, but are unlikely to be self-sustainable.

5.5 Future Land-use and Development Potential

The future land-use and development potential within the reaches is limited by several factors, including steep slopes, recreational sites, areas under federal management for hydropower, and some shoreline areas that are extremely remote.

5.5.1 Methodology

The future development potential is preliminarily analyzed using existing SE WA Coalition data. GIS data were not available for many areas of the SE WA region, and no parcel data are digitized for the three counties. Google Earth was used in conjunction with zoning maps and public lands maps. The areas that appeared to be private lands were then analyzed for growth potential using Google Earth. The gross acres of land within the shoreline jurisdiction was then compared to the applicable density set forth in the zoning codes. The total acres of public lands and lands with significant development constraints, such as steep

slopes, lack of land access, or mostly consumed by rights-of-ways, are identified as development constraints.

Information was also gathered from the Planning Directors for all three counties relating to the history and trends for building permit and shoreline substantial development permits (SSDP) for all the waterways. Information from existing documents was used to compile characterization summaries in Section 4 above. These existing documents include past Shoreline Master Plans.

- Comprehensive Plans
- County and Municipal Code Regulations
- Zoning and shoreline designations

5.5.2 Data Gaps

Typically, the method for analysis for future land use and development is conducted using data from GIS data sets including parcel information, land ownership, zoning designations, and comprehensive plan land-use designations. The biggest data gap is the lack of this GIS data set information. To fill this data gap, the shoreline visioning process for the SE WA Coalition jurisdictions will be an important piece of planning for future land use and identifying the future development potential within the shorelines.

5.5.3 Land Development Potential Summary

Due to the lack of GIS information and data sets, the information obtained from the past planning documents and Google Earth aerial imagery was reviewed to determine existing land uses. As highlighted in Section 4.1 and Appendices A through F, the SE WA region has significant shoreline areas under federal and state ownership, which will limit development on those shorelines. Other areas along the shoreline include steep slopes, parks, farms, active ports, and major roadways. These waterways are important to farmers, local citizens, ports, shipping, regional recreation, and federally listed endangered species. Balancing these uses will be key to planning for the future of these shorelines.

Based on information from the Planning Directors in the SE WA Coalition, shoreline development trend over the last 5 years was fairly light in the SE WA region. Within the

last 5 years, Asotin County issued 10 SSDPs and 5 exemptions; Columbia County has not issued any SSDPs and issued 5 exemptions for single-family residential homes; and Garfield County has not issued any SSDPs or exemptions for single-family permits. The last SSDP issued in Garfield County was for the Central Ferry grain storage and barge facility.

Much of the SE WA region is agricultural and forested land, along with significant areas under federal and state ownership. Table 30 summarizes future development potential within the shoreline jurisdiction based upon the methodologies described in Section 5.5.1.

Table 30
Future Development Potential by Main Waterbody

Reach	Area (acres)	Zoning	Development Constraints	Developable	Future Development Potential[1]
Asotin Creek and Associated Tributaries					
Asotin Creek	802	Rural Residential	• Asotin Creek Wildlife Area • Shoreline in FEMA Floodplain • ESA-listed salmonids	692 acres	138 lots; 5-acre parcels
South Fork Asotin Creek	188	Rural Residential	• 100% publicly owned • ESA-listed salmonids	0 acres	Owned by WDFW; potential recreational development by the State
North Fork: Asotin Creek	360	Rural Residential	• Mostly publicly owned • ESA-listed salmonids	54 acres	8 lots; 5-acre parcels
George Creek	72	Rural Residential	• Severely erodible soils • Landslide Hazards • ESA-listed salmonids	72 acres	8 lots; 5-acre parcels
Grande Ronde and Associated Tributary					
Grande Ronde: Reach 1	1852	Rural Residential	• Snake River Road runs along shoreline • Steep Cliffs • ESA-listed salmonids • Limited road access in parts of reach	361 acres	12 lots; 5-acre parcels
Grande Ronde: Reach 2	981	Rural Residential	• FEMA floodplain • ESA-listed salmonids • Limited road access	431 acres	86 lots; 5-acre parcels
Joseph Creek	424	Agricultural	• FEMA floodplain • ESA-listed salmonid • Limited road access	88 acres	2 lots; 40-acre parcels

Table 30
Future Development Potential by Main Waterbody

Reach	Area (acres)	Zoning	Development Constraints	Developable	Future Development Potential[1]
Snake River					
Reach 1	1,718	Rural Residential	• Almost no road access • Steep cliffs	1,252 acres	250 lots; 5-acre parcels
Reach 2	511	Rural Residential	• Highway 129 runs along the shoreline the entire reach • Northern portion is already highly developed • Shoreline managed by USACE and hardened	0 acres	No future development potential
Reach 3	1,492	Agricultural Transition	• Highway 12 runs along the entire shoreline • Steep cliffs • Publicly owned	0 acres	No future development potential
Reach 4	2,422	Agricultural	• No road access • Steep cliffs • USACE owned/operated	0 acres	No future development potential
Reach 5	3,649	Agricultural, Industrial	• USACE owned/operated	5 acres	Future development potential at Central Ferry for recreation purposes
Reach 6	2,611	Agricultural	• USACE owned/operated • Steep cliffs	0 acres	No future development potential
Reach 7	1,320	Agricultural, Heavy Industrial	• USACE owned/operated • Little road access	0 acres	No future development potential
City of Clarkston	259.8	Commercial Industrial	• Shoreline already developed by USACE • USACE, City, or Port owned	1.7 acres	5 to 7 acres of aquatic Port of Clarkston land

Table 30
Future Development Potential by Main Waterbody

Reach	Area (acres)	Zoning	Development Constraints	Developable	Future Development Potential[1]
Forest Service Creek Group					
Mill Creek Forest Service Group	58	W-1	• USFS owned • No roads	0 acres	No future development potential
North Fork Wenaha: Forest Service	42	W-1	• USFS owned • No roads	0 acres	No future development potential
Butte Creek Forest Service Group	267	Not zoned	• USFS owned • No roads	0 acres	No future development potential
Third Creek Forest Service Group	175	Not zoned	• USFS owned • No roads	0 acres	No future development potential
Crooked Creek Forest Service Group	319	Not zoned	• USFS owned • No roads	0 acres	No future development potential
First Creek Forest Service Group	43	Not zoned	• USFS owned • No roads	0 acres	No future development potential
Touchet River and Associated Tributaries					
Touchet River	850	AR-1 A-2 A-1 LI-1	• FEMA floodplain • Erodible soils • ESA-listed salmonids	430 acres	296 acres A-1: 7 lots, 40-acre parcels 28 acres A-2: 5 potential, 5-acre parcels 118 acres AR-1: 118 potential, 1-acre parcels
South Fork Touchet River	855	AR-1	• FEMA floodplain • Landslide hazards • ESA-listed salmonids	568 acres	568 acres: 1-acre parcels

Table 30
Future Development Potential by Main Waterbody

Reach	Area (acres)	Zoning	Development Constraints	Developable	Future Development Potential[1]
Wolf Fork Touchet River	393	AR-2 AR-1	• FEMA floodplain • Steep, heavily forested slopes • Limited road access	336 acres	302 acres AR-2: 60 potential 5-acre parcels 34 acres zoned A-1
North Fork Touchet River	587	AR-3	• FEMA floodplain • ESA-listed salmonids	528 acres	528 acres AR-2: 105 potential 5-acre parcels
Tucannon River and Associated Tributary					
Tucannon River: Reach 1	805	USFS A-1 R-1	• 100% publicly owned	0 acres	No future development potential
Tucannon River: Reach 2	2,636	A-1 Rural Recreational	• FEMA floodplain	1,500 acres	1,500 acres A-1: 37 potential 40-acre parcels
Tucannon River: Town of Starbuck	58.5	Not zoned	• Entire reach is already developed	0 acres	No potential future development
Panjab Creek	111	Umatilla National Forest	• Entire reach is USFS	0 acres	No potential future development

Notes:
1 Future development potential is based upon areas identified with growth potential compared to applicable density set forth in the zoning codes. See Section 5.5.1 for methodology. Redevelopment or expansion within existing developed areas is possible in some areas identified with no future development potential.

ESA = Endangered Species Act
FEMA = Federal Emergency Management Agency
USACE = U.S. Army Corps of Engineers
USFS = U.S. Forest Service
WDFW = Washington Department of Fish and Wildlife

5.5.4 Preliminary Shoreline Environment Designation Considerations

The information in this report provides the foundation for developing the SE WA Coalition's SMP. Information is organized by waterbodies and reaches to allow for SMP provisions tailored to local conditions found along shorelands. Goals, policies, and regulations will be established based on these conditions. Described in this section are background information on environment designations and a preliminary discussion on how elements of the state classification system may apply to conditions in the SE WA region.

Environment designations are applied based on specific criteria and include a purpose statement, a description of the classification criteria, management policies, and environment-specific regulations.

5.5.4.1 State Recommended Classification System

The state has identified a recommended classification system that can be used as a starting point in considering environment designations most applicable to the Coalition jurisdictions. These consist of "high-intensity," "shoreline residential," "urban conservancy," "rural conservancy," "natural," and "aquatic," as described in WAC 173-26-211.

The purpose for each of these environment designations is described in WAC 173-26-211:

- **High-intensity**: "…Provide for high-intensity water-oriented commercial, transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded."
- **Shoreline residential**: "…Accommodate residential development and appurtenant structures that are consistent with this chapter. An additional purpose is to provide appropriate public access and recreational uses."
- **Urban conservancy:** "…Protect and restore ecological functions of open space, flood plain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses."
- **Rural conservancy**: "…Protect ecological functions, conserve existing natural resources and valuable historic and cultural areas in order to provide for sustained resource use, achieve natural flood plain processes, and provide recreational opportunities. Examples of uses…include low-impact outdoor recreation uses, timber

harvesting on a sustained-yield basis, agricultural uses, aquaculture, low-intensity residential development and other natural resource-based low-intensity uses."

- **Natural:** "…Protect those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use. These systems require that only very low-intensity uses be allowed in order to maintain the ecological functions and ecosystem-wide processes. Consistent with the policies of the designation, local government should include planning for restoration of degraded shorelines within this environment."
- **Aquatic**: "…Protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high-water mark."

Local governments may also establish a different designation system or may retain their current environment designations, provided these are consistent with the purposes and policies of WAC 173-26-211. "Parallel environments" can also be used where appropriate, with shorelands divided into different sections generally running parallel to the shoreline or along a physical feature such as a bluff. In applying environment designations, the state reminds local governments that they should ensure that existing shoreline ecological functions are protected with the proposed pattern and intensity of development, and that restoration potential for an area is considered (WAC 173-26-211).

5.5.4.2 Preliminary Considerations

Developing and applying environment designations in each jurisdiction will come in later steps in the SMP update process. In preparation for this, an initial description of shoreland areas with high-intensity, residential, conservancy and natural characteristics is described in Table 31. This initial description will provide a starting point for drafting environment designations, which will be applied at the reach level in the future. The listing of these areas under the high-intensity and other categories should not imply that this is what these areas will be designated in the SMP update process. Developing and applying environment designations in each Coalition jurisdiction will occur with more detailed analysis of the information in this report, input from the Planning Commissions, Councils, and Ecology, and input from the public during the shoreline visioning process and other public forums.

Table 31
Preliminary Environment Designation Consideration

Shoreland Characteristics	Applicable Geographic Areas					
	Asotin Creek and Associated Tributaries	Grande Ronde River and Associated Tributary	Snake River	Forest Service Creek Group	Touchet River and Associated Tributaries	Tucannon River and Associated Tributary
High-intensity	• N/A		• SR 2c • Reach 3 (State Park) • Reach 4 and 5 (Lower Granite Dam) • Reach 5 (Port of Garfield) • Reach 6 and Reach 7 (Little Goose Dam) • Reach 7 (Port of Columbia) • Clarkston SR 1b and 1c (developed shorelines)			
Residential	• Asotin SR 1e		• SR 2a			• Starbuck (developed)

Shoreland Characteristics	Applicable Geographic Areas					
	Asotin Creek and Associated Tributaries	Grande Ronde River and Associated Tributary	Snake River	Forest Service Creek Group	Touchet River and Associated Tributaries	Tucannon River and Associated Tributary
Conservancy	• Asotin SR 1a – SR 1d • George Creek	• Reach 1 • Reach 2 • Joseph Creek	• Reach 1 • SR 2b • Reach 3 • Reach 4 • Reach 5 • Reach 7 • Clarkston SR 1a • Clarkston SR 1b and 1c (undeveloped shorelines)		• Reach 1 • South Fork Touchet River • Wolf Fork Touchet River • North Fork Touchet River	• SR 1a and 1b • Panjab Creek • Reach 2 • Starbuck (undeveloped)
Natural	• SF Asotin • NF Asotin		• Reach 4 (WDFW property)	• Mill Creek • NF Wenaha • Butte Creek • Third Creek • Crooked Creek		

Notes:
NF = North Fork
SF = South Fork
WDFW = Washington Department of Fish & Wildlife

6 PUBLIC ACCESS

The terrain surrounding many of these watersheds is steep in many areas, limiting road and upland access. The amount of public access currently available in all of the reaches is a function of availability of public roads or if the stretch of river is accessible by boat. Given this restriction, it may be challenging to provide additional public access in some areas; however, where public access exists, there may be opportunities to improve existing access. Resource constraints may also limit public use in some areas.

Access is also influenced by how much of the shoreline is publically owned. Large stretches of the Snake River, Tucannon River, Grande Ronde River, and all of the streams in the Forest Service Group are publicly owned, increasing public access opportunity potential. Some of these areas are remote. Opportunities will be investigated further during the community visioning and public outreach. The Public Access Plan will be developed after the visioning and will provide an in-depth discussion on access opportunities. Existing public access opportunities are summarized in Table 32.

Table 32
Public Access by Reach and Subreaches

Shoreline	Site Name	Facilities	Jurisdiction(s)
Asotin Creek and Associated Tributaries			
Reach 1 Asotin Creek	Headgate County Park	Informal water access/no established facilities	Asotin County
	Blankenship Access	Informal water access/no established facilities	
South Fork Asotin Creek	Asotin Creek Wildlife Area	Informal water access/no established facilities	
North Fork Asotin Creek	Asotin Creek Wildlife Area	Informal water access/no established facilities	
George Creek	George Creek Unit Wildlife Area	Informal water access/no established facilities	
Grande Ronde River and Associated Tributary			
Reach 1 Grande Ronde River	Bezona	Camping, restrooms	Asotin County
	R. Boggan	Camping, boat launch, restrooms	
	C. Boggan	Restrooms	
	Cottonwood	Restrooms	
	Turkey Bend	Camping	
Reach 2 Grande Ronde River	Schumaker Grade Recreation Area	Boat launch, camping	
	Ebson 1	Camping, restrooms	
	Ebson 2	Camping, boat launch, restrooms	
	Ebson 3	Camping	
	Ebson 4	Boat launch, restrooms	
Joseph Creek	Chief Joseph State Wildlife Recreation Area	Parking, restrooms	
Snake River			
Reach 1 Snake River	Hellar Bar	Boat launch, restrooms, camping	Asotin County
	Couse Creek	Primitive boat launch, picnic area	
Reach 2 Snake River	Chief Looking Glass Park	Boat launch, restrooms, day use	
	Greenbelt Trail	Day use, trail	
	Swallow's Nest Park	Boat launch, docks, playground, restrooms	

Shoreline	Site Name	Facilities	Jurisdiction(s)
Reach 3 Snake River	Golf Course (or Elm Street) Pond	Restrooms	Asotin County
	Chief Timothy State Park	Boat launch, restrooms, camping, RV	
Reach 4 Snake River	Offield Landing	Boat launch, docks, camping, restrooms	
Reach 5 Snake River	Central Ferry	Boat launch, restroom	Garfield County
	Willow Landing	Boat launch, camping, picnic area, restroom	
	Lambi Creek	Primitive camping, restroom	
	Illia Landing	Boat launch, camping, restroom	
Reach 6 Snake River	Little Goose Landing	Camping, restrooms	Columbia County
Reach 7 Snake River	Texas Rapids Recreation Area	Boat launch, camping, restroom	
	Lyons Ferry Marina	Full service marina, camping, restrooms	
	Lyons Ferry Fish Hatchery		
City of Clarkston Reach	Snake River Bikeway	Trail, restrooms	Asotin County
	Greenbelt Trail	Trail, restrooms	
	Hell's Canyon Marina (Resort)	Full service marina, camping, restrooms	
Forest Service Creek Group			
Mill Creek	No formal access		Columbia County
North Fork Wenaha River	No formal access		
Butte Creek	No formal access		
Third Creek	Rudimentary trail		Columbia and Garfield County
Crooked Creek	No formal access		
First Creek	No formal access		Garfield County
Touchet River and Associated Tributaries			
Reach 1 Touchet River	Touchet Valley Golf Course	Golf, restrooms	Columbia County
	Lewis and Clark Trail State Park	Camping, restrooms, water access	

Shoreline	Site Name	Facilities	Jurisdiction(s)
South Fork Touchet River	Rainwater Wildlife Area	No formal public access	Columbia County
Wolf Fork Touchet River	No formal access		
North Fork Touchet River	No formal access		
Tucannon River and Associated Tributary and/or Lakes*			
Reach 1 Tucannon River	Wooten Wildlife Area	Restrooms	Columbia and Garfield County
	Deer Lake	Restrooms and fishing access	
	Watson Lake	Restrooms and fishing access	
	Beaver Lake	Restrooms and fishing access	
	Tucannon Campground	Camping, restrooms, water access	
	Curl Lake	Restrooms and fishing access	
	Big 4 Lake	Restrooms and fishing access	
Reach 2 Tucannon River	Blue Lake	Restrooms and fishing access	
	Rainbow Lake	Restrooms and fishing access	
	Spring Lake	Restrooms and fishing access	
Town of Starbuck Reach	No formal access		Columbia County
Panjab Creek	Informal fishing access, trailheads		

*Not all lakes are within shoreline jurisdiction.

7 INFORMATION SOURCES, ASSUMPTIONS, AND LIMITATIONS

This report is based on the best information available to the SE WA Coalition at the time it was produced. This information was obtained from a variety of sources and was collected and prepared for a variety of purposes over a long time period; however, a substantial effort was made to use the most accurate and current information available.

Existing data, reports, and information used for the shoreline inventory are provided in the reference section. Generally, the documents used include the SE WA Coalition's comprehensive plans and municipal codes, USFWS, and WDFW subbasin and habitat conservation plans, historical references, and scientific literature on ecological functions. The GIS data illustrated in the map folio include information on hydrology, soils, topography, vegetation, land cover, priority habitat and species concentrations, and other features.

This report relied largely on GIS data and remotely sensed imagery. Integrating various GIS layers into map folio projects often resulted in polygon boundary discrepancies. Rectification of these discrepancies was only conducted for layers and geographic locations most relevant to the SMP update. The identified shoreline jurisdiction areas are only an approximation for purposes of updating the SMP for the Coalition. Precise OHWM delineation and associated shoreline jurisdiction boundaries will be determined on a project-by-project basis based on site-specific analysis during the proposal development application and review process.

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APPENDIX A
ASOTIN CREEK
REACH CHARACTERIZATION TABLES AND REACH MAPS

APPENDIX B
GRANDE RONDE RIVER
REACH CHARACTERIZATION TABLES AND REACH MAPS

APPENDIX C
SNAKE RIVER
REACH CHARACTERIZATION TABLES AND REACH MAPS

APPENDIX D
FOREST SERVICE LAND CREEK GROUP REACH CHARACTERIZATION TABLES AND REACH MAPS

APPENDIX E
TOUCHET RIVER
REACH CHARACTERIZATION TABLES AND REACH MAPS

APPENDIX F
TUCANNON RIVER
REACH CHARACTERIZATION TABLES AND REACH MAPS

APPENDIX G
MAP FOLIO