BergerABAM

Shoreline Master Program Update

Skamania County

Final Inventory and Characterization Report

Ecology Grant No. G1500044
Task No. 5.1

June 2017

Shoreline Inventory and Characterization Report

Skamania County, Washington

Submitted to

Skamania County
Stevenson, Washington

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SHORELINE INVENTORY AND CHARACTERIZATION REPORT

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Shoreline Master Program
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ACRONYMS, ABBREVIATIONS, AND TERMS USED

BMP	best management practice
cfs	cubic feet per second
County	Skamania County
CWA	Clean Water Act
DBH	diameter at breast height
DNR	Washington State Department of Natural Resources
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FEMA	Federal Emergency Management Agency
FIRM	flood insurance rate maps
GPNF	Gifford Pinchot National Forest
HUC	hydrologic unit code
LWD	large woody debris
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NSA	Columbia River Gorge National Scenic Area
NWI	National Wetland Inventory
OHWM	ordinary high water mark
PHS	priority habitat and species
RCW	Revised Code of Washington
RM	river mile
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SMMP	Shoreline Management Master Program
SMP	Shoreline Master Program
TMDL	total maximum daily load

UGA	Urban Growth Area
UGB	Urban Growth Boundary
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area

1.0 INTRODUCTION

1.1 Background and Project Purpose

Skamania County (County) is conducting a comprehensive Shoreline Master Program (SMP) update with grant assistance from the Washington State Department of Ecology (Ecology). Substitute Senate Bill 6012, which was passed in 2003 by the Washington State Legislature, requires cities and counties to amend their local SMPs consistent with the Shoreline Management Act (SMA), Revised Code of Washington (RCW) 90.58, and Washington Administrative Code (WAC) 173.26.

In June 1974, the County first adopted the Skamania County Shorelines Management Master Program, and revised it in August 1975 and again in July 1986. This 2015 inventory and characterization is the County's latest planning effort devoted to regulating shoreline uses, development, and activities under its SMP.

The purpose of this report is to provide a basis for (1) an update of the County's shoreline management goals, policies, and regulations, and (2) identifying opportunities for public access to the County's shorelines and for restoration. This report will be used in the next steps of the SMP update – the development of shoreline environmental designations; the preparation of draft SMP goals, policies, and regulations; and the development of a plan to take advantage of restoration opportunities within the County's shoreline jurisdiction.

The County is in the process of completing all of the required steps in accordance with the terms and conditions of an Ecology grant agreement (Grant No. G1500044). As outlined by the state shoreline guidelines (WAC 173-26-201(3)), the shoreline inventory and analysis are two steps of the multi-step SMP update process covered by the grant. The other required steps include:

- Public participation in the development of shoreline goals and policies;
- Establishment of shoreline environment designations;
- Establishment of shoreline policies; and
- Preparation of shoreline regulations.

1.2 Limitations

This identification and characterization report is based on published and unpublished literature and data pertaining to Skamania County shorelines and general shoreline management and excludes the City of Stevenson and its Urban Growth Boundary (UGB) and the City of North Bonneville; these cities are responsible for developing their own SMPs. Much of the information contained in

this report was derived from aerial photography and existing GIS data, primarily compiled, collected, and analyzed by the Skamania County Department of Community Development. The scope of this identification and characterization effort included some, albeit minimal, field verification of shoreline conditions. Considerable effort went into ensuring the accuracy and completeness of the information as of spring 2015, the date of the report. This effort included soliciting information from reliable sources such as representatives of local, state, and federal agencies, tribes, and non-governmental organizations and others with knowledge of shoreline conditions.

This report serves as a basis for updating the policies and regulations contained in the County's SMP, but does not provide complete guidelines for managing each individual shoreline parcel or property over time. Much of the information presented regarding land cover, protected/priority habitats and species, and water quality and quantity is drawn from government-maintained databases, which are updated frequently to reflect changing conditions. Additional site-specific/time-specific data and/or analyses would be required to decide how specific shoreline areas should be used, developed, or restored.

This inventory and characterization information can be used as a tool for determining the potential effects of future uses and development on shoreline resources and potential opportunities for shoreline protection and restoration. However, the report is not intended as a full evaluation of the effectiveness of the SMA or the County's existing shoreline policies or regulations. The shoreline modifications described in this report could be the result of actions that occurred prior to the adoption of the SMP, actions that are exempt from SMP regulation as specified by the SMA, illegal actions, and/or actions that occurred outside the County's shoreline jurisdiction.

1.3 Regulatory Review

The state and federal regulations most relevant to development in County shoreline jurisdiction and have protective designations include the federal Clean Water Act, Columbia River Gorge National Scenic Act, Endangered Species Act, Northwest Forest Plan, Rivers and Harbors Appropriation Act of 1899, and the Wild and Scenic Rivers Act as well as the state SMA,, Hydraulic Code, and the Washington Forest Practices Act. Additional relevant federal laws include the National Environmental Policy Act (NEPA), the Anadromous Fish Conservation Act, the Clean Air Act, and the Migratory Bird Treaty Act. Additional state laws that address shoreline issues include the State Environmental Policy Act (SEPA) and acts concerning floodplain management, watershed planning, water resources, salmon recovery, and water quality protection. Tribal agreements and case law also address shoreline issues.

State and federal regulations can play important roles in the design and implementation of a shoreline project depending on the nature of the proposed

development. The regulations can ensure that impacts to shoreline functions and values are avoided, minimized, and/or mitigated. Ensuring consistency between local (county and city) regulations and state and federal requirements is one purpose of the SMP update.

The SMP intends to balance development regulations and shoreline resource protection by encouraging water-dependent or water-oriented uses while conserving or enhancing shoreline ecological functions and values. SMPs are based on Ecology's guidelines, but are tailored to the particular conditions and needs of the local community.

The County's 2007 comprehensive plan and various other provisions of County, state, and federal laws and regulations control most uses, development, and activities in shoreline jurisdictions. Jurisdictions must comply with all applicable regulations prior to the start of any use, development, or activity in shoreline jurisdiction. The County ensures consistency between the SMP and other County codes, plans, and programs by reviewing each during the periodic updates of the County's comprehensive plan that are required by state statute.

1.4 Shoreline Jurisdiction and Definitions

The SMA defines shoreline jurisdiction as including certain qualifying waterbodies and their adjacent upland areas that are a minimum of 200 feet landward of the ordinary high water mark (OHWM). The overall term for all in-water and upland jurisdictional areas is "shorelines of the state" and includes ""shorelines", "shorelines of statewide significance", "shorelands" and other associated features. These designations were established by law in 1972 and are described in WAC 173-18 and WAC 173-20. "Shorelines" include the portions of all streams or rivers having a mean annual flow of 20 cubic feet per second (cfs) or greater and lakes with a surface area of 20 acres or greater (RCW 90.58.030). The U.S. Geological Survey determined which streams and rivers have a flow of 20 cubic feet per second or more and the location on the stream or river which exceeds this threshold downstream of which qualifies as a shoreline.[1] [2]"Shorelines of statewide significance" are of greater importance, and include marine waterbodies, rivers west of the Cascade Range that have a mean annual flow of 1,000 cfs or greater, and freshwater lakes with a surface area of 1,000 acres or more (RCW 90.58.030). "Shorelands" include the banks, beaches, deltas, and riparian areas upland from the OHWM that are within 200 feet of these shoreline and shoreline of statewide significance waterbodies.

[1] U.S. Geological Survey (USGS). 2003. Determination of Upstream Boundary Points on Southeastern Washington Streams and Rivers Under the Requirements of the Shoreline Management Act of 1971.
[2] U.S. Geological Survey (USGS). 1998. Determination of Upstream Boundaries on Western Washington Streams and Rivers Under the Requirements of the Shoreline Management Act of 1971.

SMP jurisdiction must include all "associated wetlands" (RCW 90.58.030) and the adjacent contiguous floodplain, or area extending 200 feet from the floodway, whichever is greater. "Associated wetlands" are wetlands that are in proximity to and either influence or are influenced by tidal waters or a lake or stream subject to the SMA (WAC 173-22-030 (1)). These water bodies are generally identified as wetlands that are located within the minimum 200-foot shoreline jurisdiction, or wetlands that are located beyond the 200-foot minimum and are functionally related to the shoreline jurisdiction through a surface water connection. A list of all of the shoreline jurisdiction areas within the County are provided in Table 5-1 of this report. The minimum shoreline jurisdiction maps are provided in Appendix A (Map 1).

As RCW 90.58.030(2)(d) states, a local jurisdiction may include an area in shoreline jurisdiction that is beyond the statutory minimum. This "optional" shoreline jurisdiction area may include: (1) all or part of the floodplain beyond the 200-foot mark from the OHWM or floodway, and/or (2) a buffer necessary to protect a critical area. A jurisdiction may choose to regulate either, both, or none of these types of areas beyond the statutory minimum jurisdiction. The inclusion of the entire floodplain and all critical area buffers in shoreline jurisdiction is the statutory "maximum area" to which the SMP would apply.

2.0 METHODS

2.1 Data and Information Sources

A preliminary step in the SMP update is to inventory and characterize the County's shorelines. The inventory and characterization were conducted in accordance with Ecology's SMP guidelines as established by WAC 173-26, which state that shoreline and characterizations to support SMP amendments should be based on the most current accurate, scientific, and technical information. While the development of the characterizations and inventories that are the essence of this report did not include any new field surveys or other data collection, the characterizations and inventories are based on the most current accurate, scientific, and technical information (see Section 1.0 for a list of sources).

The analysis was conducted on lands within the statutory minimum shoreline jurisdiction of the County, including the UGB of North Bonneville, but excluded the lands within cities of North Bonneville and Stevenson and the Stevenson UGB. Stevenson is in the process of pre-designating its UGB per WAC 173-26-150, but North Bonneville has not, and so the County's SMP includes an area of jurisdiction along the Columbia River south of the City of North Bonneville. Areas of Stevenson will be under the County's jurisdiction until annexation occurs.

Following an inventory of the existing data and information, which primarily include County and regional planning documents and technical studies, BergerABAM distributed a list of proposed information sources to the County and Ecology. The information that was collected was augmented with information from the County, stakeholders, scientific literature, personal communications, aerial photographs, and data available on the internet. Section 1.0 lists technical and scientific references. The county-wide GIS map folio prepared for this SMP update is included as Appendix A, along with a complete list of GIS/mapping data sources. The datagaps, which include missing, outdated, or poor quality information that limited the assessment of shoreline processes, functions, alterations, restoration opportunities, and the reach analysis, are provided in Section 6.0.

2.2 Establishing Shoreline Jurisdiction

The first step in updating the map of shoreline jurisdictions was to review the definitions of shoreline and associated wetlands in RCW 90.58.030 and the related guidance in WAC Chapter 173-22 and in Chapter 5 of Ecology's *Shoreline Master Programs Handbook* (SMP Handbook) (Ecology 2012e). The discussion that follows describes the process used to map the preliminary County jurisdiction that will be refined during later SMP tasks. The preliminary jurisdiction maps for the County and the accompanying letter with the rational are provided in Appendix B.

2.2.1 General Applicability

With reference to Skamania County, the SMA generally applies to all rivers and streams with mean annual flow over 20 cfs; lakes and reservoirs exceeding 20 acres;

wetlands associated with these areas; and lands extending landward a minimum of 200 feet from the OHWM or 200 feet from the floodway along streams, where floodway information is available.

2.2.2 Ordinary High Water Mark

Since no data source is available for establishing the precise location of an OHWM, the County used various GIS layers to depict an approximation of shoreline jurisdictional waters.[3] A 200-foot offset was applied from the edges of these waterbodies as an approximation of the OHWM. In some instances, however, only stream centerline data – not stream polygons – was available. For these streams, a 200-foot offset was applied from the centerline as an approximation of shoreline jurisdiction. Ecology does not require SMPs to show the precise location of the OHWM. The statutory definition of the OHWM will be included in the updated Skamania County SMP. The precise location of the OHWM and adjacent shorelands will have to be determined case-by-case as property owners file development applications.[4]

2.2.3 County Shorelines

Freshwater rivers and streams in Skamania County that are designated "shorelines of the state" under WAC 173-18-340 and WAC 173-20-620 include the streams and lakes listed in Table 5-3 below. See Appendix A Map 1.

2.2.4 County Shorelines of Statewide Significance

RCW 90.58.030(2)(f) defines shorelines of statewide significance. Relevant definitions for Skamania County include:

- "Those lakes, whether natural, artificial, or a combination thereof, with a surface acreage of one thousand acres or more measured at the ordinary high water mark"
- "Those natural rivers or segments thereof as follows: any west of the crest of the Cascade range downstream of a point where the mean annual flow is measured at one thousand cubic feet per second or more" and "any east of the crest of the Cascade range downstream of a point where the annual flow is measured at two hundred cubic feet per second or more."

Ecology maintains spatial datasets that are used to describe the diverse natural and cultural environments in Washington. Using the definitions above and the spatial datasets "Suggested Shoreline Arcs" and "Suggested Shorelines Polygon," the shorelines of statewide significance in Skamania County include Swift Reservoir,

[3] Washington State Department of Ecology "SMA – Streams and rivers – points," "SMA – Streams and rivers – arcs," "SMA – Adopted arcs," "Suggested Shoreline Points," "Suggested Shoreline Arcs," and "Suggested Shorelines Polygons," and Washington State Department of Natural Resources (DNR) "Hydrography."

[4] Washington State Department of Ecology, Shoreline Master Program Handbook, Chapter 5, p. 2.

Spirit Lake, the Columbia River, and portions of Lava Creek, Trout Lake Creek, White Salmon River, Little White Salmon River, Wind River, and Lewis River. See Appendix A Map 1.

2.2.5 Associated Wetlands

The County used its wetland database to determine associated wetlands. Originally, County wetland data came from the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) database (U.S. Fish and Wildlife Service 2015a). Ecology guidance states that an entire wetland is associated if any part of it lies within the area 200 feet landward of the OHWM of a state shoreline. Further guidance states that wetlands that are hydraulically connected to a shoreline are also considered associated. Wetlands that are separated by an obvious topographic break from the shoreline are not associated, provided they are outside the shoreline area and that the break is not an artificial feature such as a berm or road. To determine which wetlands were associated, the County and BergerABAM used GIS to select wetlands that were:

- partially or fully within the shoreline area, and/or
- within the 100-year floodplain, 200-feet from the floodway or OHWM, or
- shown as having a surface hydrologic connection to the shoreline area (stream or drainage connectivity to the shoreline).

See Appendix A Map 1 and Map 6.

2.2.6 Flood Hazard Areas

Under RCW 90.58.030, minimum shoreline jurisdiction also includes the floodway and contiguous floodplain extending 200 feet landward from the floodway. The floodway may be identified in one of two ways: (1) using flood insurance rate maps (FIRMs) developed by the Federal Emergency Management Agency (FEMA), or (2) using the SMA floodway as defined in RCW 90.58.030(2)(b)(ii):

> "Floodway" means the area, as identified in a master program, that… (ii) consists of those portions of a river valley lying streamward from the outer limits of a watercourse upon which flood waters are carried during periods of flooding that occur with reasonable regularity, although not necessarily annually, said floodway being identified, under normal condition, by changes in surface soil conditions or changes in types or quality of vegetative ground cover condition, topography, or other indicators of flooding that occurs with reasonable regularity, although not necessarily annually. Regardless of the method used to identify the floodway, the floodway shall not include those lands that can reasonably be expected to be protected from flood waters by flood control devices maintained by or maintained under license from the federal government, the state, or a political subdivision of the state;"

The County and BergerABAM reviewed FIRMs for Skamania County, but floodway information was not available. In addition, no maps are available that show the SMA floodway. Thus, the minimum jurisdiction maps rely on the OHWM to map shorelines, as directed by Ecology.[5] See Appendix A Map 1 and Map 6.

2.2.7 Channel Migration Zone Analysis

In accordance with WAC 173-26.020, this report contains information on the general location of channel migration zones within the County's shoreline jurisdiction. Channel migration zones are defined as the area that a stream has historically occupied and is reasonably likely to move to over a defined period of time (Ecology 2014c). Ecology developed a planning-level CMZ delineation (pCMZ) method to support local communities' updates and their implementation of the SMA requirements (Ecology 2014c). For the purposes of this report and on behalf of the County, Ecology provided a planning-level assessment of channel migration zones within the County. Ecology's methodology for this analysis is provided in Appendix C of this report (Channel Migration Zone Analysis for SMA Streams in Skamania County).

Due to budget and time constraints, the County was divided into two parts – low development potential (e.g., federally owned land) and higher development potential (e.g., privately held land within the Gifford Pinchot National Forest (GPNF) and privately owned land within the rest of the County). In low-development areas, the pCMZ was auto-generated based on channel confinement and width, and in the higher development areas, a standard pCMZ analysis was performed. The analysis was a fairly abbreviated process relying on visible landforms, channel characteristics, valley characteristics, historic migration, and soils/geology. Channel migration rates were not analyzed. Considering the abbreviated nature of the analysis, the pCMZs are relatively conservative. More precise or narrower CMZs could be generated, but a more detailed analysis would require significantly more time and costs. This pCMZ analysis is preliminary without field verification and may require site-specific analysis prior to use in shoreline development or application.

2.2.8 Federal Lands, Tribal Lands, and Columbia River Gorge National Scenic Area

A large portion of Skamania County is under federal ownership (U.S. Forest Service [USFS]), tribal lands), or is in the Columbia River Gorge National Scenic Area (NSA) as shown in Appendix A – Map 7. Significant federal lands within the County include the Franz Lake National Wildlife Area, Gifford Pinchot National Forest, Mount St. Helens National Monument, USFS Columbia River Gorge NSA-owned lands, and the Pierce National Wildlife Refuge. The SMP Handbook indicates that Ecology assumes federal lands are within shoreline jurisdiction unless a local government provides documentation of exclusive federal jurisdiction (Ecology

[5] Washington State Department of Ecology, Shoreline Master Programs Handbook, Chapter 5 p. 20.

2012e). The County approached the USFS to begin determining whether that agency's land in the Gifford Pinchot National Forest is under sole federal jurisdiction, but at this stage, the County has mapped preliminary shoreline jurisdiction as applying to all federal lands and to the NSA, per the guidance provided in Chapter 5 of Ecology's Shoreline Master Program Handbook. Under the terms of the Ecology grant contract no. G1500044, "the shoreline jurisdiction area will be refined during later tasks to identify and eliminate shorelines from the local SMP that are under sole jurisdiction of federal or tribal governments." Non-federal shoreline use and development (e.g., private/commercial) on federal and/or tribal lands is subject to local SMP regulation (e.g., third party vendor/lease activities on private in-holder parcels) for project review and permitting. This SMP does not apply to federal activities on federal land or tribal activities on tribal land, but does apply to any shoreline use and/or development activities initiated by a non-federal agency/individual on federal lands or on non-tribal member-owned land within a tribal reservation.

2.2.9 Optional Shoreline Jurisdiction

In accordance with RCW 90.58.030(2)(d), local jurisdictions may also include additional areas within shoreline jurisdiction beyond the statutory minimum. These "optional" shoreline jurisdiction areas may include (1) all or part of the floodplain beyond the 200-foot mark from the OHWM or floodway; and (2) buffers necessary for the protection of critical areas. Local jurisdictions may choose to regulate some or all of the above described areas beyond the statutory minimum jurisdiction. If the entire floodplain and all critical area buffers are included in shoreline jurisdiction, this is the statutory "maximum area" to which the SMP would apply. Appendix A shows the optional jurisdiction areas (entire 100-year floodplain). The County has not yet determined whether it will choose to extend shoreline jurisdiction into optional jurisdiction areas.

2.3 Analysis Methods of Ecosystem-wide Processes

Ecosystem-wide processes were assessed for this report at the watershed scale using water resource inventory area (WRIA) boundaries. Ecosystem-wide processes refers to the dynamic physical and chemical interactions that create and maintain natural landscapes at the geographic scales of watersheds to watershed basins. The SMP Handbook refers to these processes as the movement of water, sediment, nutrients, pathogens, toxins, and wood as they enter, travel through, and leave a watershed (Ecology 2012e). Ecosystem or watershed processes may occur over larger landscapes that include shorelines and watersheds that drain to shorelines. These processes determine both the type and level of performance of shoreline functions.

The analysis conducted for this inventory and characterization used GIS data from various sources to identify and map aquatic resources, including all rivers, lakes, and wetlands that are subject to County jurisdiction. The contributing areas are defined as the area within the boundaries of each WRIA surface water drainage.

Each WRIA within the county is divided into smaller hydrologic units. Each unit is referred to in other sections of the report by its unique 12-digit hydrologic unit code (HUC). Ecosystem-wide processes that affect ecological functions within the County's shoreline jurisdiction were identified. They include: (1) hydrologic movement of surface and subsurface water, (2) movement of sediment, toxics, nutrients, and pathogens, and (3) movement of water, sediment, and large woody debris. The ecosystem process-intensive areas within the County, which have the greatest influence on the dynamics of a specific process and aquatic resources, were also identified and mapped using GIS. Afterwards, altered or degraded areas (e.g., impervious land cover, roads, etc.) were identified and mapped as ecosystem-wide process alterations. Table 2-1 summarizes the ecosystem-wide processes, functions, and impairments. See Section 3.4 for more detailed descriptions of ecosystem-wide processes, functions, and impairments.

Table 2-1. Summary of Ecosystem-wide Processes, Functions, and Impairments

Ecosystem-wide Process	Ecological Function Group	Ecological Function	Impairment
Hydrologic movement of surface and subsurface water	Water quantity functions	Storage of surface water in floodplains and depressional wetlands	Water withdrawals for irrigation
Movement of sediment, toxics, nutrients, and pathogens	Water quality functions	Removal of sediment, toxics, nutrients, and pathogens	Steep watershed with little floodplain/ wetlands to remove toxins, toxins in Columbia River
Movement of water, sediment, and large woody debris	Habitat functions	Provision of aquatic habitat for invertebrates, native fish, amphibians, birds, and mammals	Dams on Columbia River hold sediments behind them and limit sediment transfer

2.4 Shoreline Reach-Scale Inventory

The reach-scale inventory focuses on the WAC-designated shorelines that are considered to be under the jurisdiction of Skamania County. Reaches are specific segments of the shoreline; the analysis focuses on reaches as a means of facilitating an in-depth discussion of shoreline functions. Reaches are sometimes referred to as management areas and can be distinguished by their relative intensity of land use patterns, physical landscape, and various ecosystem processes.

Skamania County has approximately 581 linear miles of shoreline and 166 miles of lakeshore on lakes that are designated as shorelines of the state. The streams and lakes within the County were divided into reaches to facilitate the characterization of shoreline conditions. Stream reaches were identified based on various biophysical data over shoreline streams using GIS data, land use zoning, current land uses, ecosystem functions, stream confluences, aerial photographs, and 12-digit HUC boundaries. The reaches were split using the shortest distance from the intersection of stream centerlines to the edge of the shoreline jurisdiction.

Not all biophysical features identified through this process resulted in a reach break. For forested/federal lands, reaches were broadly determined primarily based on HUC boundary locations. The urban land reaches along the Columbia River were determined based on land use zoning, current land uses, and HUC boundary locations. Each of the reaches was evaluated using relevant GIS layers (e.g., aerials, Light Detection and Ranging, etc.) to most accurately estimate the hydrologically correct location for the reach break. In cases where a tributary to the Columbia River was not associated with a HUC boundary, the reaches were split by using the shortest distance from the intersection of stream centerlines to the edge of the shoreline jurisdiction. Most lakes have only one inventory reach and were determined using OHWM. The Swift Reservoir was divided into twelve reaches based on 12-digit HUC, OHWM, and stream confluences.

In order to create consistency for the inventory and characterization, the team applied a naming system to the reaches within each HUC. The naming system begins upstream with the creek/stream name and the number 1 and moves sequentially downstream toward the river mouth (e.g., 2, 3, 4, etc.).

3.0 ECOSYSTEM CHARACTERIZATION AND ECOSYSTEM-WIDE PROCESSES

3.1 Introduction and Regional Overview

This overview provides a basis for understanding how ecosystem-wide processes affect and shape shoreline functions, in accordance with WAC 173-26-201(3)(d). The information is presented broadly and provides a context for the reach-scale discussion in Section 4.0 of this report. Maps depicting the shoreline attributes discussed in this section are provided in Appendix A.

Skamania County is located in the southwestern portion of Washington, and has an area of 1,070,080 acres or approximately 1,672 square miles (U.S. Department of Agriculture Natural Resources Conservation Service [USDA NRCS] 1990 "Soil survey of Skamania County area, Washington"). The County extends northward from the north shore of the Columbia River through the Cascade Range, north of Mount St. Helens, to the border of Lewis County. Skamania County also extends from the eastern border of Clark County and southeastern corner of Cowlitz County to the western border of Klickitat County and southwestern corner of Yakima County. The mountains of the Cascade Range, which are part of a ring of volcanoes and associated mountains around the Pacific Ocean known as the Ring of Fire, dissect the County. Significant drainage basins within the County include portions of the Columbia River and four WRIAs: WRIA 26 (Cowlitz), WRIA 27 (Lewis), WRIA 28 (Salmon-Washougal), and WRIA 29 (Wind-White Salmon). The Washougal River watershed is the only portion of WRIA 28 that is located within the County. The WRIAs were formalized under WAC 173-500-040 and authorized under the Water Resources Act of 1971, RCW 90.54. Further discussion of each of these significant drainage basins within the County is provided below.

Columbia River

The Columbia River basin drains approximately 260,000 square miles and includes seven states (Washington, Oregon, Idaho, Nevada, Utah, Wyoming, and Montana), 13 federally recognized Indian reservations, and British Columbia in Canada (Washington State Department of Ecology 2015a). Its headwaters are in British Columbia and the mouth of the Columbia River is located between Astoria, Oregon and Ilwaco, Washington. The portion of the Columbia River that is designated as a County shoreline of statewide significance flows from east to west and extends approximately 37 linear miles from river mile (RM) 128.5 to 168.1 and from land to the midline/state line of the river. One exception is the portion of shoreline from approximately RM 149 to 151, which is under the City of Stevenson's jurisdiction. The City of North Bonneville boundary is landward of the Columbia River and the City has not predesignated its NSA Urban Area per WAC 173-26-150. Therefore, this report includes an area of County jurisdiction along the Columbia River not within the City of North Bonneville, and extends to the midline of the Columbia River.

WRIA 26 Cowlitz

WRIA 26 Cowlitz has a drainage basin of approximately 2,492 square miles and includes the Cowlitz River and its tributaries, which drain the region around Mount Rainier, Mount Adams, and Mount St. Helens and enters the Columbia River downstream of Skamania County near Longview. WRIA 26 includes approximately 285 square miles of the north portion of Skamania County. The major surface waters within the WRIA that are located within the County include the following: North Fork Toutle River, Green River, Lower Cispus River, and the Upper Cispus River. Some of the significant lakes located in this portion of WRIA 26 include Deadman's Lake, Venus Lake, Elk Lake, Hanaford Lake, Coldwater Lake, Saint Helens Lake, Spirit Lake, Takhlakh Lake, and Council Lake.

WRIA 27 Lewis

WRIA 27 Lewis has a drainage basin of approximately 1,308 square miles and includes the Lewis River watershed, which generally flows west from Mount Adams and toward the Columbia River entering downstream of Skamania County near Woodland. Approximately 638 square miles of WRIA 27 are located within the west and north-central parts of the County. The streams and rivers of WRIA 27 generally flow southwest through the Gifford Pinchot National Forest and pass south of Mount St. Helens before entering Clark County to the south and Cowlitz County to the north. The major surface waters of WRIA 27 that are located within Skamania County include the headwaters of the Lewis River, Muddy River, Upper Lewis River, Middle Lewis River, Lower Lewis River, and East Fork Lewis River. Some of the significant lakes and reservoirs located in WRIA 27 include Swift Reservoir and Placid Lake.

WRIA 28 Salmon-Washougal

WRIA 28 Salmon-Washougal is approximately 495 square miles, of which approximately 160 square miles are located within the southwest portion of the County. The major surface waters of WRIA 28 that are located within the County include the Washougal River, West Fork Washougal River, Hamilton Creek, Tanner Creek, and portions of the Columbia River. The headwaters of the Washougal River are located within the Gifford Pinchot National Forest, and the river and its tributaries generally flow south and then west through Clark County toward the Columbia River entering downstream of Skamania County at Camas. Duncan Creek, Hamilton Creek, Tanner Creek, and Woodward Creek flow south directly into the Columbia River. Some of the significant lakes located in WRIA 28 include Franz Lake and Woody's Lake.

WRIA 29 Wind-White Salmon

WRIA 29 Wind-White Salmon is approximately 902 square miles. Approximately 589 square miles of WRIA 29 are located within the County. The Wind and White Salmon rivers headwaters are located on the southwest flanks of Mount Adams, and the rivers and their tributaries generally flow southward to the Columbia River; the

Wind River enters near Carson and the White Salmon River enters upstream at Underwood along the County's eastern boundary. Approximately two-thirds of the WRIA is located within the Gifford Pinchot National Forest. The major surface waters of WRIA 29 that are located within the County include the Wind River, Eagle Creek, Rock Creek, White Salmon River, Little White Salmon River, and Mosier Creek. Some of the significant lakes located in WRIA 28 include Swampy Meadows, Big Mosquito Lake, Goose Lake, Drano Lake, Ashes Lake, and Wauna Lake.

3.2 Hydrogeological Setting

3.2.1 Climate and Precipitation

Skamania County climate greatly varies due to the influence of the Cascade Range (USDA NRCS 1990). Within the Columbia River Gorge, winds blow alternately from east and west. The winds that blow from the Pacific Ocean tend to be mild and moist during the winter and cool and dry during the summer, which causes a tempering effect on climate (USDA NRCS 1990). The topography of Skamania County also strongly influences its climate. The Cascade Range protects the area from the high summer and low winter temperatures of Eastern Washington and the Coast Range protects the County from severe winter storms moving inward from the Pacific Ocean (USDA NRCS 1990). While, the Columbia Gorge allows air exchange between the inland and coastal areas (USDA NRCS 1990).

Precipitation and temperature vary with elevation, proximity to mountainous areas, and the season (USDA NRCS 1990). In general, inland from the Columbia River, as the elevation increases, rainfall is higher and temperatures are lower. At lower elevations near the Columbia River, the average annual precipitation is less than 70 inches. At higher elevations to the west of the Cascade Range crest, the average annual precipitation is more than 70 inches (USDA NRCS 1990). The average annual precipitation decreases to 35 inches east of the Cascade Range crest along the Columbia River because of the rainshadow effect. The interior mountainous valleys within the Wind River basin receive average annual precipitation of greater than 90 inches (Skamania County 2007 Skamania County 2007 Comprehensive Plan).

According to Appendix A of Ecology's SMP Handbook (Ecology 2012e), climate change in Washington may result in environmental impacts that affect shorelines and the ecosystems that they support. Some potential effects of climate change include, but are not limited to: altered hydrological cycles that may affect flooding and water resources; increased sediment in glacier-fed rivers that may result in increased flooding, aggradation, and channel movement; and increased landslides, which may result in more wood and sediment inputs to streams, and potentially increase flooding, channel movement, and transport of wood to hazardous positions (Beason and Kennard 2006).

3.2.2 Geology, Topography, and Soils

The County is located within the Cascade Range uplift, a region characterized by deeply dissected mountains and towering volcanoes. The physiographic features of the County are characterized by rugged mountain areas, river floodplains, and low terraces. The south portion of the County near the Columbia River is primarily mountainous with some nearly level terraces, the west-central portion is primarily mountainous with some terraces, and the north portion is mainly mountainous with some foothills at the base of Mount St. Helens and Mount Adams. Elevations range from near sea level on the Columbia River to approximately 3,000 feet above sea level on the mountain crests in the southern portion of the County. Elevation ranges from approximately 1,000 feet at Swift Creek Reservoir to 8,365 feet at Mount St. Helens in the northern portion of the County. (Information within this section comes from the 1990 soil survey of the Skamania County area completed by the USDA NRCS.)

The Cascade Range within the County contains the most complete stratigraphic section of Tertiary and Quaternary volcanic rocks in the state. The Wind River portion of the County contains extensive deposits of Cenozoic lava and volcanic debris which are divided into four units: Ohanapecosh Formation, Eagle Creek Formation, Yakima Basalt, and Quaternary basalt flows.

The Ohanapecosh Formation of the Mount Rainier region is the oldest unit, dating back to the Eocene to early Oligocene, and extends to the Columbia River. This formation is almost 19,000 feet thick. The lower two-thirds of the unit are mostly composed of andesitic pyroclastic debris in tuff breccia while the upper 6,000 feet are composed of conglomerate, sandstone, tuff, and pyroclastic breccia. The top of the Ohanapecosh Formation was deeply weathered following folding and uplift.

The andesitic gravel and sand of the Eagle Creek Formation were deposited over the Ohanapecosh Formation during the early Miocene epoch, which occurred roughly 5.33 to 23.03 million years ago. The Eagle Creek Formation was eroded to approximately 1,300 feet during the late Miocene and then inundated by Yakima Basalt from the east to a thickness of up to 2,000 feet. Three very deep, well-drained soils were formed in residuum and colluvium from these formations, including Aschoff, Skoly, and Zygore soils. Aschoff and Zygore soils are very gravelly loams, while the Skoly series is predominantly a very cobbly loam.

Tectonic plate movement folded stratigraphy and volcanic eruptions of andesitic and basaltic volcanoes occurred in the area during the Pliocene epoch, roughly 2.58 to 5.33 million years ago. Uplift and erosion left behind scattered plugs of diorite and diabase, which are types of igneous rocks. Beacon Rock and Wind Mountain are remnants of these plugs. The plug formations resulted in the Dougan soils, a very gravelly loam that was formed in residuum and colluvium.

Alluvial deposits from the massive glacial floods during the late Pleistocene epoch (roughly 11,700 to 2.58 million years ago) have resulted in highly erodible soils in the lower elevations near the Columbia River. The basalt and underlying sedimentary rock on the north side of the Gorge were stripped away by floods, thereby leaving unstabilized rock units more prone to landslides. The Cascade Landslide Complex is a local example of these landslide-prone areas that began wasting into the Columbia River from the southern slopes of Table Mountain and Greenleaf Peak approximately 1,000 years ago and covered nearly 15 square miles. Part of this complex is the more recent Bonneville landslide that is estimated to have occurred roughly 600 years ago. The Bonneville landslide created the Bridge of the Gods, a natural dam in the Columbia River approximately 200 feet high and 3.5 miles long, located between North Bonneville and Stevenson. The Bonneville landslide, consisting of the Eagle Creek Formation and Yakima Basalt, exposed the Red Bluffs and formed Steever soils, which are very deep, well-drained soils. Another landslide located between Dog Mountain and Wind Mountain consists of material from the Ohanapecosh Formation and is still active. This landslide moves approximately 40 to 50 feet a year at its upper end and 5 to 10 feet per year at its toe.

Volcanic activity in the Quaternary period was limited to basalt flows from at least 10 different vents and consisted of olivine, platy olivine, and low-alumina basalt. Stabler soils on terraces in the upper Wind River area were formed from accumulated volcanic ash and pumice from Red Mountain and Trout Creek Hill volcano flows and flows from the Big Lava Bed north of Willard. Chemawa soils formed in alluvium derived from volcanic ash and basalt. Both Stabler and Chemawa soils are very deep and well drained.

Mount St. Helens is a late Quaternary age volcano, located on the west side of the Cascade Range. Pyroclastic flow, lahar, and alluvium materials are interbedded with tephra and glacial drift in the valley adjacent to the volcano. Soils formed from these materials include Shoestring and St. Helens soils, which have a mantle of volcanic ash 20 to 35 inches thick, and Polepatch and Forsyth soils that have little or no mantle of ash.

Mount St. Helens had been dormant for 123 years until its eruption on 27 March 1980. Volcanic and earthquake activity continued until its cataclysmic eruption on 18 May 1980. A 5.1-magnitude earthquake gave way to an avalanche of rock, mud, and ice that was followed by blasts of superheated gas, ash, and rock fragments. The avalanche spilled into Spirit Lake and filled the valley of the North Fork of the Toutle River with up to 200 feet of debris in some areas. The blast covered an area 8 miles long and 15 miles wide, and sent material almost 14 miles up into the atmosphere in a large ash cloud. Most of the ash fell over Eastern Washington and parts of Idaho and Montana.

Melted water from Mount St. Helens snow and glaciers combined with volcanic debris to create large mudflows called lahars. The mudflows swept down the creeks and rivers on the southeast flank of the volcano before dumping into the east end of the Swift Reservoir. A large mudflow in the North Fork and South Fork of the Toutle River swept down the valley, depositing mud and debris into the Cowlitz River and the Columbia River.

Deposits from the May 1980 eruption and six smaller eruptions later that year are grouped into two categories: flows and aerial deposits. The flows include mudflows, avalanche debris flows, and pyroclastic flows that range from less than 1 foot to several hundred feet in thickness. Mudflows and pyroclastic flows streamed over a part of the avalanche debris flow. The Studebaker series, a gravelly loamy sand, was mapped on the avalanche debris flow and the Panhandle series, an extremely cindery loamy sand, was mapped on the pyroclastic flow. The largest mudflows were the east and southeast flanks of the volcano and scoured and eroded the soils in narrow passages, depositing several feet of debris in wide flat areas.

The aerial deposits associated with the May 1980 eruption include ash and pumice and are up to 30 inches thick. Deposits more than 20 inches thick are part of the Elk Prairie series and soils that have an ash layer of 4 to 20 inches thick have an overblown phase of the original soil series. The deepest aerial deposit from the eruption is located approximately 5 to 6 miles north of the volcano within and near the North Fork Toutle River watershed, and includes debris from the blast. The depth of aerial deposits decreases in all directions from this location. The aerial deposits largely consist of volcanic ash to the north and northwest while the surface layer to the northeast and east is predominantly cindery.

3.3 Natural Resources and Critical Areas Characterization Inventory

Natural resources and critical areas are ecologically important to the shoreline environment. The regulatory landscape for critical areas within shoreline jurisdiction is complicated. Critical areas are required to be regulated by local jurisdictions in critical area ordinances adopted under the Growth Management Act (GMA) and are defined as wetlands, critical aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas and geologically hazardous areas (RCW 36.70A.030(5). Local critical areas ordinances, such as Skamania County Code (SCC), Title 21 – Critical Areas, continue to apply within shoreline jurisdiction until an updated SMP has been adopted in compliance with the 2003 SMP Guidelines. After a locally adopted SMP has been approved by Ecology, the updated SMP provides the sole means of regulation for critical areas within shoreline jurisdiction. However, the critical areas ordinance would continue to regulate critical areas partly within shoreline jurisdiction and partly outside, if the SMP does not include land extending to the outside edge of the critical area buffer.

Most critical areas ordinances were required to be updated to meet "best available science" (BAS) standards in 2005. At that time, Ecology reviewed proposed critical area protection standards in local ordinances and provided comments to jurisdictions. However, because critical area standards were adopted by local jurisdictions under their authority provided under the GMA, Ecology did not have regulatory authority to approve critical areas ordinances. For example, Ecology may have commented that a jurisdiction's critical area buffers were inadequate, but the local jurisdiction was under no legal obligation to address concerns expressed by Ecology.

Critical areas regulations and the SMP Guidelines rely on two different, but similar, standards for regulating critical areas. SMPs use a "no net loss" standard, which ensures that critical areas and their buffers are not further degraded within shoreline jurisdiction or, if impacts are found to be unavoidable under mitigation sequencing, that mitigation for impacts must be provided. The 2003 SMP Guidelines require that critical areas provisions be incorporated into local SMPs to protect these areas. A jurisdiction's local critical areas ordinance provisions may or may not meet SMP Guidelines and may need to be revised prior to incorporation into the SMP. Because Ecology has final approval authority for local SMPs, critical areas provisions within SMPs are required to meet the no net loss standard, meaning that Ecology requires that the most up-to-date technical and scientific standards for the protection of critical areas be incorporated into SMPs. Critical area protection standards are balanced with the need to provide for water-oriented uses within shoreline jurisdiction, a key tenant of the SMA.

This section describes natural resources and critical areas of state and local concern, which are to be protected and preserved because they perform many valuable social and ecological functions, as identified by RCW 36-70A-060 (Natural resource lands and critical areas – Development Regulations) and Skamania County Code (SCC) Title 21A – Critical Areas. These areas help alleviate congestion, noise and odors, air pollution, and water quality degradation. This overview does not include all of the County's species and habitats, but is meant to generally describe the natural resources that may be affected by its shoreline planning. Additional information regarding the specific locations of these natural resources and critical areas is provided in Section 4.0 and Appendix A – Maps 5 and 6. Some of the critical areas within Skamania County's shoreline jurisdiction include watershed protection areas, fish and wildlife protection areas, and geologically hazardous areas as discussed in the following sections. This information is helpful in establishing the baseline ecological condition to use in the no net loss analysis that occurs later in the SMP update process. The table below provides an overview of the SMP critical areas and their correlation to the SCC critical areas. For the purposes of this report, the natural resources and critical areas will be described in the context of SMP definitions.

Table 3-1. SMP Critical Areas and SCC Critical Areas Definitions

SMP Critical Area	SCC Critical Area
Wetlands Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.	**Watershed Protection Areas (includes wetlands):** Watershed protection areas include natural resources, such as wetlands, ponds, lakes, streams, creeks, and rivers; frequently flooded areas; and aquifer recharge areas. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
Aquifer Recharge Areas: Aquifer recharge areas are defined as areas with a critical recharging effect on aquifers used for potable water	**Watershed Protection Areas (includes aquifer recharge areas)** Aquifer recharge areas are where an aquifer that is a source of drinking water is vulnerable to contamination that would affect the potability of the water
Fish and Wildlife Habitat Conservation Areas Fish and wildlife habitat conservation areas include (a) areas with endangered, threatened, and sensitive species, (b) habitats and species of local importance, (c) commercial and recreational shellfish areas, (d) kelp and eelgrass beds, herring, smelt, and other forage fish spawning areas, (e) naturally occurring ponds under twenty areas and their submerged aquatic beds, (f) waters of the state, (g) lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity, (h) state natural area preserves, natural resource conservation areas, and state wildlife areas. The sections below provide more detail on the fish and wildlife habitat conservation areas within the County's shoreline jurisidiction.	**Fish and Wildlife Protection** Fish and wildlife protection areas include those areas where the presence of species listed by the federal government or the state as endangered, threatened, and sensitive has been documented; sites containing and located within 300 feet of habitat for priority habitat species as listed and mapped by the Washington Department of Fish and Wildlife (WDFW), priority habitats mapped by WDFW; and all streams that meet the criteria for streams set forth in WAC 22-16-030, WAC 22-16-031, and Title 21A of SCC.
Frequently Flooded Areas Frequently flooded areas applies to areas identified in the County by FEMA flood insurance rating maps (FEMA 2016) and are typically mapped as 100-year floodplains.	**Watershed Protection Areas (includes frequently flooded areas)** Frequently flooded areas are lands in the floodplain subject to a 1 percent or greater chance of flooding in any given year. These areas include, but are not limited to, streams, rivers, lakes, coastal areas, wetlands, and the like. Frequently flooded areas applies to areas identified in the County by FEMA flood insurance rating maps (FEMA 2016) and are typically mapped as 100-year floodplains.
Geologically Hazardous Areas Geologically hazardous areas include areas susceptible to erosion, sliding, earthquake, or other geological events that pose a threat to the health and safety when incompatible commercial, residential, or industrial development is sited in areas of significant hazard (WAC 365-190-120). The areas that are susceptible to one or more of the following types of hazards are to be classified as geologically hazardous areas: (a) erosion hazard, (b) landslide hazard, (c) seismic hazard,	**Geologically Hazardous Areas** Geologically hazardous areas are areas that because of their susceptibility to erosion, sliding, earthquake or other geological events, are not suited to the siting of commercial, residential, or industrial development consistent with public health or safety concerns. Geologically hazardoud areas include erosion hazard areas, landslide hazard areas, seismic hazard areas, volcanic hazard areas, and mine hazard areas.

SMP Critical Area	SCC Critical Area
and (d) areas subject to other geological events such as coal mine hazards and volcanic hazards such as mass wasting, debris flows, rock falls and differential settlement (WAC 265-190-120(3)).	

3.3.1 Wetlands

Wetlands provide various water quality, hydrogeological, and habitat functions. Wetlands are defined by RCW 36.70A.030 as areas that are "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands typically include marshes, swamps, bogs, fens, ponds, lakes, artificial wetlands created from non-wetland areas to mitigate for the conversion of wetlands, and other similar areas. According to RCW 36.70A.030, wetlands do not include artificial wetland created on non-wetland sites for non-mitigation purposes, such as irrigation and drainage ditches, canals, detention facilities, swales, wastewater treatment facilities, farm ponds, landscape amenities, or wetlands unintentionally created after 1 July 1990, as the result of road, street, or highway construction. Regulated streams, creeks, and rivers are naturally occurring bodies of periodic or continuously flowing water contained within a channel (i.e., an open conduit either naturally or artificially created), except for artificially created irrigation, return flow, or stock watering channels (Skamania County Code Title 21A). All wetlands and river deltas that are associated with streams and lakes within the County are considered to be part of the minimum shoreline jurisdiction and are to be covered under the SMP (RCW 90.58.030(2)(d)).

Wetlands perform important ecological functions within ecosystems and protect private/public investments and aesthetic values (Ecology 2001 Publication no. 90-31). These functions include, but are not limited to:

- *Improved water quality:* wetlands trap sediments and retain excess nutrients and pollutants such as heavy metals, some of which are taken up and used by wetland plants and/or converted to less harmful chemical forms in soil. Wetlands, ponds, and lakes serve as settling basins for naturally occurring sedimentation.
- *Flood control and protection:* wetlands hold excess runoff after a storm event and then release it at a slower velocity. Their capacity to reduce flooding depends on their size, shape, soil type, and location.
- *Shoreline stabilization:* when wetlands are located along the banks of rivers and streams or lake shorelines, they help protect shoreline soils from erosion by currents. Their plants dissipate the water's energy and provide stability by binding soils with their root systems.

- *Groundwater recharge and stream flow maintenance:* wetlands retain water and facilitate groundwater infiltration. They function as part of the hydrologic cycle and maintain stream flow through their interconnections with groundwater, streamflow, and lake/reservoir water levels.
- *Habitat:* wetlands provide breeding, foraging, and cover for many fish, bird, mammal, reptile, and amphibian species, including many federally or state listed threatened, endangered, candidate species.
- *Educational opportunities:* wetlands serve as areas for scientific study and natural resource education.
- *Recreational opportunities:* wetlands serve as areas for boating, fishing, hunting, and swimming.

Various types of wetlands are found throughout the County along rivers and streams, in slope/depressional areas, and in places where groundwater surfaces (Appendix A – Map 6). According to the USFWS NWI Wetlands Mapper (U.S. Fish and Wildlife Service 2015b) the major wetland types found within the County include:

- *Freshwater emergent wetlands:* non-tidal wetlands such as herbaceous marshes that are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. The vegetation is present for most of the growing season in most years and is usually dominated by perennial plants.
- *Freshwater forested/shrub wetlands:* non-tidal wetlands such as forested swamps that are generally characterized by woody vegetation that is 6 meters tall or taller.
- *Freshwater ponds:* non-tidal wetlands that do not have an active wave-forming or bedrock shoreline feature and have a water depth of less than two meters in the deepest part of the basin.
- *Lakes:* wetlands and deepwater habitats that have a total area of greater than 20 acres and are situated in a topographic depression or a dammed river channel. Lakes lack trees, shrubs, persistent emergent vegetation, and emergent mosses or lichens with greater than 30 percent aerial coverage.
- *Riverine wetlands:* wetlands and deepwater habitats contained in natural or artificial channels that periodically or continuously contain flowing water that forms a link between two bodies of water.

3.3.2 Aquifer Recharge Areas

Aquifer recharge areas are defined as areas with a critical recharging effect on aquifers used for potable water (RCW 36.70A.030). Aquifers are bodies of rock or soil that contain sufficient saturated permeable material to conduct groundwater and yield economically significant groundwater quantities to springs and wells (Skamania County 2011). According to Washington State Department of Ecology's

guidance document for critical aquifer recharge areas (Washington State Department of Ecology 2005c), aquifer recharge is likely to occur where wetlands, streams, rainfall, snowmelt, or irrigation water infiltrates into the ground and adds water underground that can supply water to a well.

3.3.3 Fish and Wildlife Habitat Conservation Areas

The purpose of fish and wildlife habitat conservation areas is to maintain populations of species in suitable habitats within their natural geographic distribution so that the habitat available is sufficient to support viable populations over the long term. According to WAC 365-190-130, fish and wildlife habitat conservation areas include: (a) areas with endangered, threatened, and sensitive species; (b) habitats and species of local importance; (c) commercial and recreational shellfish areas; (d) kelp and eelgrass beds, herring, smelt, and other forage fish spawning areas; (e) naturally occurring ponds under 20 acres and their submerged aquatic beds; (f) waters of the state; (g) lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity; and (h) state natural area preserves, natural resource conservation areas, and state wildlife areas. The sections below provide more detail on the fish and wildlife habitat conservation areas within the County's shoreline jurisidiction.

3.3.3.1 Areas with Endangered, Threatened, and Sensitive Species

Skamania County provides habitat for several state and federally listed, proposed threatened and endangered species, and species of concern (**Error! Reference source n ot found.**2). Critical habitat has been designated within the County for Oregon spotted frog (*Rana pretiosa*), northern spotted owl (*Strix occidentalis caurina*), Chinook salmon (*Oncorhynchus tshawytscha*) (Upper Columbia River spring run ecologically significant unit [ESU] and Lower Columbia River ESU), chum salmon (*Oncorhynchus keta*) (Columbia River ESU), steelhead salmon (*Oncorhynchus mykiss*) (Upper Columbia River distinct population segment [DPS], Middle Columbia River DPS, Lower Columbia River DPS, and Snake River DPS), and bull trout (*Salvelinus confluentus*). The steelhead salmon Upper Columbia River ESU, Upper and Middle Columbia River DPS, and Snake River DPS have only migratory habitat within the Columbia River portion of Skamania County. Large areas of the County throughout the Gifford Pinchot National Forest are designated critical habitat for the northern spotted owl.

Table 3-2. Listed, Proposed, and Candidate Threatened and Endangered Species within Skamania County Shoreline Jurisdiction

Common name	Scientific name	Federal status[1]	State status[2]
Birds			
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Candidate
Northern spotted owl	*Strix occidentalis caurina*	Threatened	Endangered
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Threatened

Common name	Scientific name	Federal status[1]	State status[2]
Western grebe	*Aechmophorus occidentalis*	None	Candidate
Golden eagle	*Aquila chrysaetos*	None	Candidate
Northern goshawk	*Accipiter gentilis*	None	Candidate
Peregrine falcon	*Falco peregrinus*	Delisted	Sensitive
Vaux's swift	*Chaetura vauxi*	None	Candidate
Black-backed woodpecker	*Picoides arcticus*	None	Candidate
Lewis' woodpecker	*Melanerpes lewis*	None	Candidate
Pileated woodpecker	*Dryocopus pileatus*	None	Candidate
Loggerhead shrike	*Lanius ludovicianus*	Species of Concern	Candidate
Purple martin	*Progne subis*	None	Candidate
Slender-billed white-breasted nuthatch	*Sitta carolinensis aculeata*	None	Candidate
Streaked horned lark	*Eremophila alpestris strigata*	Threatened	Endangered
Fish			
Bull trout	*Salvenlinus confluentus*	Threatened	Candidate
Pacific lamprey	*Entosphenus tridentata*	Species of Concern	None
River lamprey	*Lampetra ayresi*	Species of Concern	Candidate
Green sturgeon	*Acipenser medirostris*	Threatened	None
Leopard dace	*Rhinichthys falcatus*	None	Candidate
Mountain sucker	*Catostomus platyrhynchus*	None	Candidate
Chinook salmon (Upper Columbia River spring run ESU, Lower Columbia River ESU)	*Oncorhynchus tshawytscha*	Threatened	Candidate
Chum salmon (Columbia River ESU)	*Oncorhynchus keta*	Threatened	Candidate
Lower Columbia River coho salmon	*Oncorhynchus kisutch*	Threatened	None
Steelhead salmon (Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, and Snake River DPS)	*Oncorhynchus mykiss*	Threatened	Candidate
Sockeye salmon (Snake River DPS)	*Oncorhynchus nerka*	Endangered (Snake River)	Candidate
Invertebrates			
Columbia Oregonian snail	*Cryptomastix hendersoni*	None	Candidate
Columbia River tiger beetle	*Cicindela columbica*	None	Candidate
Pacific clubtail dragonfly	*Gomphus kurilis*	None	Candidate
Chinquapin hairstreak butterfly	*Habrodais grunus herri*	None	Candidate
Johnson's hairstreak butterfly	*Mitoura johnsoni*	None	Candidate
Mardon skipper butterfly	*Polites mardon*	Species of Concern	Endangered
Mammals			
Townsend's big-eared bat	*Corynorhinus townsendii*	None	Candidate
Western gray squirrel	*Sciurus griseus*	None	Threatened

Common name	Scientific name	Federal status[1]	State status[2]
Cascade red fox	*Vulpes vulpes cascadensis*	None	Candidate
Fisher (West Coast DPS)	*Martes pennanti*	Proposed Threatened	Endangered
North American wolverine	*Gulo gulo luscus*	None	Candidate
Canada lynx	*Lynx Canadensis*	Threatened	Threatened
Gray wolf	*Canis lupus*	Endangered	Endangered
Plants			
Wormskiold's northern wormwood	*Artemisia campestris var. wormskioldii*	Candidate	Endangered
Oregon bolandra	*Bolandra oregana*	None	Sensitive
Dense sedge	*Carex densa*	None	Threatened
Large-awned sedge	*Carex macrochaeta*	None	Threatened
Smoky Mountain sedge	*Carex proposita*	None	Threatened
Golden chinquapin	*Chrysolepis chrysophylla var. chrysophylla*	None	Sensitive
Tall bugbane	*Cimicifuga elata*	Species of Concern	Sensitive
Few-flowered collinsia	*Collinsia sparsiflora var. bruceae*	None	Sensitive
Clackamas corydalis	*Corydalis aquae-gelidae*	Species of Concern	Sensitive
Cusick's monkeyflower	*Diplacus cusickii*		Threatened
Howell's daisy	*Erigeron howellii*	Species of Concern	Threatened
Gorge daisy	*Erigeron oreganus*	Species of Concern	Threatened
Green-keeled cotton-grass	*Eriophorum viridicarinatum*	None	Sensitive
Pulsifer's monkeyflower	*Erythranthe pulsiferae*	None	Sensitive
Black lily	*Fritillaria camschatcensis*	None	Sensitive
Common bluecup	*Githopsis specularioides*	None	Sensitive
Diffuse stickseed	*Hackelia diffusa var. diffusa*	None	Threatened
Western sweetvetch	*Hedysarum occidentale var. occidentale*	None	Sensitive
Howell's rush	*Juncus howellii*	None	Threatened
Bog clubmoss	*Lycopodiella inundata*	None	Sensitive
White meconella	*Meconella oregana*	Species of Concern	Endangered
Northern microseris	*Microseris borealis*	None	Sensitive
Branching montia	*Montia diffusa*	None	Sensitive
Mexican muhly	*Muhlenbergia mexicana var. mexicana*	None	Sensitive
Rosy owl-clover	*Orthocarpus bracteosus*	None	Endangered
Harford's ragwort	*Packera bolanderi var. harfordii*	None	Sensitive
Fringed grass-of-parnassus	*Parnassia fimbriata var. hoodiana*	None	Threatened
Barrett's beardtongue	*Penstemon barrettiae*	Species of Concern	Threatened
Wilcox's penstemon	*Penstemon wilcoxii*	None	Sensitive
Oregon yampah	*Perideridia oregana*	None	Sensitive
Whitebark pine	*Pinus albicaulis*	Candidate	None

Common name	Scientific name	Federal status[1]	State status[2]
Great polemonium	*Polemonium carneum*	None	Threatened
California swordfern	*Polystichum californicum*	None	Threatened
Downy butter-cup	*Ranunculus hebecarpus*	None	Sensitive
Persistentsepal yellowcress	*Rorippa columbiae*	Species of Concern	Threatened
Marginate splashzone moss	*Scouleria marginata*	None	Threatened
Scribner's grass	*Scribneria bolanderi*	None	Sensitive
Oregon white-top aster	*Sericocarpus oregonensis ssp. oregonensis*	None	Threatened
White-top aster	*Sericocarpus rigidus*	Species of Concern	Sensitive
Pale blue-eyed grass	*Sisyrinchium sarmentosum*	Species of Concern	Threatened
Western ladies' tresses	*Spiranthes porrifolia*	None	Sensitive
Oregon sullivantia	*Sullivantia oregana*	Species of Concern	Endangered
Flat-leaved bladderwort	*Utricularia intermedia*	None	Sensitive
California compassplant	*Wyethia angustifolia*	None	Sensitive
Reptiles/Amphibians			
Oregon spotted frog	*Rana pretiosa*	Threatened	Endangered
Cascade torrent salamander	*Rhyacotriton cascadae*	None	Candidate
Larch Mountain salamander	*Plethodon larselli*	None	Sensitive
Van Dyke's salamander	*Plethodon vandykei*	None	Candidate
Western toad	*Anaxyrus boreas*	None	Candidate
Western pond turtle	*Actinemys marmorata*	None	Endangered
California mountain kingsnake	*Lampropeltis zonata*	None	Candidate
Common sharp-tailed snake	*Contia tenuis*	None	Candidate

1: Information for Planning and Conservation (U.S. Fish and Wildlife Service 2016), Endangered and Threatened Marine Species under NMFS' Jurisdiction (NOAA Fisheries 2016), Washington Natural Heritage Program Reference Desk (Washington State Department o Natural Resources 2016).

2: Washington State Species of Concern Lists (Washington Department of Fish and Wildlife 2016) and Washington Natural Heritage Program Reference Desk (Washington State Department o Natural Resources 2016).

Federally listed and state-candidate salmonid species are protected under Title 21A of the County code, and many have habitat within the rivers and streams of Skamania County. Salmon habitat includes the chemical, physical, and biological components of the environment that support salmon. Documented salmonid species within the County include Chinook, steelhead, chum, coho, sockeye, and pink salmon as well as bull trout and cutthroat trout (StreamNet 2015; Washington Department of Fish and Wildlife 2015a, Washington Department of Fish and Wildlife 2015b). Section **Error! Reference source not found.** provides details on the salmonids t hat are listed by federal or state agencies as endangered or threatened, are a federal or state candidate species, and/or have designated critical habitat within the County. A broad overview of the salmonids found in each of the County's WRIAs is provided below.

WRIA 26 (Cowlitz)

WRIA 26 has documented migration, spawning, and rearing habitat for fall-run Chinook salmon, spring-run Chinook salmon, coho salmon, and winter-run

steelhead salmon, as well as migration habitat for summer-run steelhead salmon (StreamNet 2015). A summer-run population (or subpopulation) of chum salmon was historically documented returning to the Cowlitz River (Lower Columbia Fish Recovery Board 2010). Populations of spring-run Chinook, winter-run steelhead, and coho in WRIA 26 include both naturally and hatchery-produced fish (Lower Columbia Fish Recovery Board 2010).

WRIA 26 historically accounted for a significant portion of Washington's lower Columbia spring-run Chinook population although a loss of access to headwater production areas in WRIA 26 severely reduced these populations (Lower Columbia Fish Recovery Board 2010). A loss of access to upstream areas of the Cowlitz River and its tributaries caused by waterfalls and human-made impassable barriers, such as dams, has also reduced historical runs such as fall-run Chinook, coho salmon, winter-run and summer-run steelhead salmon, and other species (Lower Columbia Fish Recovery Board 2010). Yale Reservoir, which is located downstream of this WRIA, has has bull trout (Washington Department of Fish and Wildlife 2015b) and documented coastal cutthroat trout habitat (Washington Department of Fish and Wildlife 2015c). Cutthroat spawn from January to April and most juveniles rear 2 to 3 years before migrating from their natal stream (Lower Columbia Fish Recovery Board 2010). In general, upland shoreline conditions have the potential to effect downstream shoreline conditions outside of the County's shoreline jurisdiction.

WRIA 27 (Lewis)

WRIA 27 has documented migration, spawning, and rearing habitat for summer-run steelhead salmon and bull trout (StreamNet 2015). The Lewis River also has a relatively large and highly viable fall-run Chinook population (Lower Columbia Fish Recovery Board 2010) and documented coastal cutthroat trout habitat (Washington Department of Fish and Wildlife 2015a).

WRIA 27 had historical populations of spring-run Chinook, coho, and summer- and winter-run steelhead. Human-made impassable barriers and a loss of access to headwater production areas severely reduced the distribution of some populations (Lower Columbia Fish Recovery Board 2010). Populations of spring-run Chinook, winter- and summer-run steelhead, and coho in WRIA 27 include both naturally and hatchery produced fish (Lower Columbia Fish Recovery Board 2010).

The current distribution of bull trout is limited to the Upper Lewis River and several Columbia River Gorge streams. The bull trout populations are considered to be at moderate risk of extinction (Lower Columbia Fish Recovery Board 2010).

WRIA 28 (Salmon-Washougal)

WRIA 28 has documented migration, spawning, and rearing habitat for fall-run Chinook, coho, summer-run steelhead, winter-run steelhead, and fall-run chum, as well as migration habitat for bull trout and spring- and summer-run Chinook

(StreamNet 2015). The WRIA also has documented coastal cutthroat trout (Washington Department of Fish and Wildlife 2015a).

Salmon and steelhead salmon populations have declined from historical levels and there are significant extinction risks for fall-run Chinook, chum, summer- and winter-run steelhead, and coho because of a loss of tributary habitat quantity and quality, predation, and harvest and hatchery impacts). Populations of summer- and winter-run steelhead, chum, and fall-run Chinook in WRIA 28 include both naturally and hatchery-produced fish (Lower Columbia Fish Recovery Board 2010).

WRIA 29 (Wind-White Salmon)

WRIA 29 has documented migration, rearing, and spawning habitat for fall-run Chinook, spring-run Chinook, and summer- and winter-run steelhead, as well as migration habitat for bull trout and coho (StreamNet 2015). The WRIA also has documented fall-run chum (Washington Department of Fish and Wildlife 2015a).

Summer-run steelhead has high abundance and productivity in the Wind River watershed, and has a lower current risk of extinction). Summer-run and winter-run steelhead, chum, and fall-run Chinook in WRIA 29 include both naturally and hatchery produced fish (Lower Columbia Fish Recovery Board 2010).

The 2011 removal of the Condit Hydroelectric Dam, which was constructed in 1913 on the White Salmon River within Klickitat County, was expected to provide access to approximately 32.4 miles of river and tributary habitat for steelhead and salmon; restore connectivity to spawning, rearing, foraging, and overwintering habitat for bull trout in the river; and have an overall potential of increased production for salmonids (Ecology 2010a). WDFW surveys from 2013 indicated that fall-run Chinook were spawning upstream of the former site of the dam (U.S. Geological Survey 2015). In a 2014 WDFW survey, spring Chinook abundance estimates were approximately two or three times more than observations in 2013 (U.S. Geological Survey 2015). NOAA Fisheries has developed a recovery plan for the federally listed species in the White Salmon River (NOAA Fisheries 2013b).

Columbia River

The Columbia River, which flows along the southern boundaries of WRIA 28 and WRIA 29, has documented migration habitat for bull trout and for spring-, summer-, and fall-run Chinook salmon, as well as coho salmon, summer- and winter-run steelhead, sockeye salmon, fall-run chum salmon, and pink salmon (StreamNet 2015). Lower Columbia River Chinook salmon populations have declined since the early 1990s due to habitat alterations and unsustainable harvest rates. Chum salmon were previously widely distributed throughout the lower Columbia River, but now spawning is primarily restricted to the areas downstream of the Bonneville Dam. The historical wild runs of salmon species within the Washington streams of the lower Columbia once approximated at a million or more but now average only

about 30,000 per year, with many salmon populations appearing to be primarily hatchery-driven (Lower Columbia Fish Recovery Board 2010).

3.3.4 Priority Habitats and Species

WDFW has designated several priority habitats within the County that are relatively important to various species of native fish and wildlife (Washington Department of Fish and Wildlife 2008). The County's priority areas include old growth/mature forest, herbaceous balds, Oregon white oak woodlands, waterfowl concentrations, biodiversity areas and corridors, freshwater wetlands, fresh deepwater habitat, instream habitat, and caves, cliffs, snags and logs, talus, and riparian habitats. These priority habitats are briefly described below. More detail on the locations of these priority habitats within the County is provided in Section 4.0 of this report.

- *Old-growth/Mature Forest:* the County has old-growth/mature forest both east and west of the Cascade crest. The old-growth on the east side of the crest is described as stands that are typically more than 150 years old and are highly variable in tree species and composition and structure characteristics because of the influence of climate, fire, and soils, and (Washington Department of Fish and Wildlife 2008). The old growth west of the Cascade crest is typically more than 200 years old and forms a multi-layer canopy with occasional small openings (Washington Department of Fish and Wildlife 2008). Mature forests have stands with crown cover of less than 100 percent, and the amount of decay, number of snags, downed material, etc., is typically less than what is found in an old growth forest.
- *Herbaceous Balds:* patches of grass and forb vegetation that are located on shallow soils over bedrock and are typically fringed by forest or woodland (Washington Department of Fish and Wildlife 2008). Dominant flora includes herbaceous vegetation, dwarf shrubs, mosses, and lichens, as well as scattered trees such as Douglas fir (*Pseudotsuga menziesii*), Oregon white oak (*Quercus garryana*), and Pacific madrone (*Arbutus menziesii*) (Washington Department of Fish and Wildlife 2008). These habitats occur within mid-montane to lowland forest zones and are typically smaller than 12 acres, but can be up to approximately 250 acres (Washington Department of Fish and Wildlife 2008).
- *Oregon White Oak Woodlands:* these habitats include stands of oak or conifer/oak associations where the canopy cover of the oak component of the stand is 25 percent or, where total canopy cover is less than 25 percent, the oak accounts for at least 50 percent of the canopy present (Washington Department of Fish and Wildlife 2008). These woodlands are used by a variety of mammals, birds, reptiles, amphibians, and invertebrates (Larson and Morgan 1998). West of the Cascades, the woodlands have typical tree associations with Douglas fir, bigleaf maple (*Acer macrophyllum*), Pacific dogwood (*Cornus nuttallii*), and Oregon ash (*Fraxinus latifolia*). East of the Cascades, the typical tree associations include

Pacific madrone, black cottonwood (*Populus balsamifera*), quaking aspen (*Populus tremuloides*), and ponderosa pine (*Pinus ponderosa*) (Larson and Morgan 1998).

- *Waterfowl Concentrations:* areas with regular concentrations of waterfowl populations.
- *Biodiversity Areas and Corridor:* Biodiversity areas are defined as: (1) areas that have been identified as biologically diverse through a scientifically-based assessment at the landscape scale, or (2) areas within a city or urban growth area (UGA) that contain valuable fish and/or wildlife habitat, and have mostly native vegetation (Washington Department of Fish and Wildlife 2008). Corridors are defined as areas of relatively undisturbed and unbroken tracts of vegetation that connect fish and/or wildlife habitat conservation areas, priority habitats, valuable habits within a city or UGA, and biologically diverse areas (Washington Department of Fish and Wildlife 2008). WDFW recommends that priority wildlife habitat information be used to inform conservation planning activities.
- *Freshwater wetlands and fresh deepwater:* freshwater wetlands are lands that are transitional between terrestrial and aquatic systems where the water table is typically near or at the surface of shallow water covers the lands. See Section 3.3.1.1 for more information on freshwater wetlands. Fresh deepwater habitats, such as lakes and ponds, are permanently flooded lands that are below the deepwater boundary of wetlands, and include environments where there is permanent and deep surface water. These habitats include all underwater features such as rock piles, caverns and woody debris.
- *Instream:* instream habitats are the combination of the in-water biological, physical, and chemical conditions and processes that interact to provide the functional requirements for wildlife and instream fish resources. See Section 3.3.1.1 for more information.
- *Caves:* are naturally occurring cavities or systems of interconnected passages that occur under the earth in soils, rock, ice, or other geological formations. Mine shafts with actual or suspected occurrences of priority species are also considered to be priority cave habitats.
- *Cliffs:* cliff priority habitats are greater than 25 feet high and occur below 5,000 feet elevation.
- *Snags and logs:* priority snags are dead or dying trees that are more than 6.5 feet tall and have sufficient decay to enable cavity excavation/use by wildlife, and a diameter at breast height (DBH) of more than 20 inches in western Washington and 12 inches in eastern Washington. Priority snag and log habitat are individual snags and/or logs, or groups of snags and/or logs of exceptional value to wildlife due to their scarcity or location.
- *Talus:* are homogenous areas of rock rubble that range from 0.5 to 6.5 feet and are composed of basalt, andesite, and/or sedimentary rock and may be associated with cliffs.

- *Riparian*: upland areas immediately adjacent to streams, ponds, lakes, and wetlands and "directly contribute to the water quality and habitat components of the water body, including but not limited to upland areas adjacent to the water body that directly contribute shade, nutrients, cover, or debris" (Skamania County Code Title 21A). These areas begin at the OHWM and extend to the portion of the terrestrial landscape that is influenced by the aquatic ecosystem (Washington Department of Fish and Wildlife 2008). Riparian areas perform several important ecological functions within ecosystems (Washington State Department of Ecology 2009) that include, but are not limited to:
  - *Shoreline stabilization:* the trees and shrubs in riparian areas stabilize the soil and prevent banks from collapsing during high water flows.
  - *Flood Control and protection:* the riparian areas absorb runoff, recharge groundwater, and gradually restore stream flow.
  - *Improved water quality:* riparian areas filter excess nutrients, pesticides, sediment, and other pollutants before they enter the water, and reduce water temperatures by providing shade.
  - *Habitat enhancement:* the trees and shrubs within the riparian areas provide food and habitat, including large woody debris (LWD), for various species of fish and wildlife.

Skamania County provides habitatfor a range of wildlife species. Common wildlife species within the County include beaver (*Castorcanadensis*), black bear (*Ursus americanus*), Columbia black-tailed deer (*Odocoileus hemionus columbianus*), coyote (*Canis latrans*), cougar (*Puma concolor*), mountain chickadee (*Poecile gambeli*), mountain goats (*Oreamnos americanus*) in the north, mountain quail (*Oreortyx pictus*), northern spotted owl *(Strix occidentalis caurina)*, northern goshawk *(Accipiter gentilis)*, pileated woodpecker *(Dryocopus pileatus)*, river otter (*Lutra canadensis*), Roosevelt elk (*Cervus canadensis roosevelti*), and Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) (Griffith 2010; Washington Department of Fish and Wildlife 2008).

Species-specific priority habitats are designated within the County for bald eagle (*Haliaeetus leucocephalus)*, Canada goose (*Branta canadensis*), Columbia black-tailed deer *(Odocoileus hemionus columbianus*), elk (*Cervus elaphus*), harlequin duck (*Histrionicus histrionicus*), mule and black-tailed deer (i.e., Rocky Mountain mule deer) (*Odocoileus hemionus hemionus*), tundra swan (*Cygnus columbianus*), Larch Mountain salamander, and purple martin.

Priority species occurrences within the County include big brown bat (*Eptesicus fuscus*), black-backed woodpecker, California mountain kingsnake, California myotis (*Myotis californicus*), Cascade torrent salamander, Chinquapin hairstreak butterfly, fisher, fringed myotis (*Myotis thysanodes*), gray wolf, great blue heron (*Ardea herodias*), Grizzly bear (*Ursus acrtos ssp*.), golden eagle, leopard dace, long-legged myotis (*Myotis volans*), Canadian lynx, marten (*Martes americana*), mountain quail, northern goshawk, Oregon spotted frog, Pacific lamprey, Pacific pond turtle,

peregrine falcon, sharptail snake, Townsend's big-eared bat (*Corynorhinus townsendii*), Van Dyke's salamander, Western gray squirrel, wolverine, Western long-eared bat (*Myotis evotis*), Western toad, and Yuma myotis (*Myotis yumanensis*). Section 4.0 of this report provides more detail on the locations of these priority species within the County.

According to Ecology (Washington State Department of Ecology 1999a), habitats in some areas of the County have been affected by farming and livestock grazing on riparian vegetation. Additionally, past logging operations concentrated near tributaries in some portions of the County have resulted in decreased riparian cover, increases in temperature and sedimentation, and changes in flow regimes (Washington State Department of Ecology 1999b). The reduction of riparian vegetation is one of the many factors that have led to the depression of some salmon populations within portions of the County (Washington State Department of Ecology 1999a). Additionally, urban development and impervious surface cover such as roads increase runoff and erosion and may have negative effects on ecological functions and processes of priority habitats within the County (Skamania County 2007). Section 4.0 of this report provides more detail on the specific impacts and effects of shoreline use activities on the condition of natural resources within the County.

3.3.5 Frequently Flooded Areas

Frequently flooded areas have been designated to protect public health, safety and welfare from harm caused by flooding and to maintain the important hydrologic functions of aquatic habitats. "Frequently flooded areas" applies to areas identified in the County by FEMA flood insurance rating maps (FEMA 2015). These areas are typically mapped as 100-year floodplains. Currently, FEMA flood insurance maps are not available for all of the County; the available FEMA flood insurance maps for the County include portions of the Headwater Lewis River, Muddy River, Upper Lewis River, and Middle Lewis River subwatersheds. Development potential exists within the floodplains throughout the County but is subject to FEMA, shoreline, and local critical areas ordinance restrictions. Once the new updated SMP is in effect, only the SMP will apply to frequently flooded areas within shoreline jurisdiction. The local critical areas ordinance will apply to areas outside the shoreline jurisdiction (Appendix A Map 6).

3.3.6 Geologically Hazardous Areas

Geologically hazardous areas include areas susceptible to erosion, sliding, earthquake, or other geological events that pose a threat to the health and safety when incompatible commercial, residential, or industrial development is sited in areas of significant hazard (WAC 365-190-120). The areas that are susceptible to one or more of the following types of hazards are to be classified as geologically hazardous areas: (a) erosion hazard, (b) landslide hazard, (c) seismic hazard, and (d) areas subject to other geological events such as coal mine hazards and volcanic

hazards such as mass wasting, debris flows, rock falls and differential settlement (WAC 265-190-120(3)). More information on these types of hazards is provided in Section 3.4.3.

3.4 Ecosystem-Wide Processes

Ecosystem processes are defined as "…the suite of naturally occurring physical and geological 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" (WAC 173-26-020-12). These processes create and maintain natural landscapes and the many natural resources discussed in Section 3.3. They can occur over various geographic scales from watershed basins to smaller subwatersheds to shoreline reaches. They include the movement of water, sediment, nutrients, pathogens, toxins, and wood as they enter into, pass through, and eventually leave a watershed (Chapter 7, Ecology SMP Handbook 2012e). The hydrogeologic setting of the County, which includes climate and precipitation as well as geology, topography, and soils, has a significant role in determining the geochemical and biological processes within watersheds.

The health and functioning of freshwater shoreline systems is influenced by the movement or storage of materials such as water, sediment, nutrients, pathogens, and organic matter (e.g., leaf litter and LWD) through watersheds. These ecosystem-wide processes within the County are discussed below.

3.4.1 Hydrologic Processes

Hydrologic processes are are those processes that move water through the hydrologic cycle. The hydrologic cycle is a continuous process by which water moves from the surface of the earth via evaporation and returns to the earth's surface through precipitation (Universities Council on Water Resources 1983). The cycle includes infiltration of water into the soil, surface-water flow, and standing water, such as lakes and oceans. Hydrologic processes are largely governed by surrounding climate, topography, geology, and soil permeability and can be altered by man-made development (e.g., constructed impervious surfaces) (Washington State Department of Ecology 2005b).

The rate at which water recharges aquifers or flows into streams, lakes and oceans is largely influenced by soil permeability and precipitation. Key areas of surface-water infiltration to groundwater include rain-on-snow areas, snow-dominated areas, channel migration zones, wetlands, lakes, and ponds. High precipitation areas will increase groundwater recharge through infiltration. Precipitation levels are higher on the west side of the Cascades and foothills than in the areas of the County that are located to the east of the mountains. Rainfall levels also increase with increasing elevation and with distance from the Columbia River.

The many freshwater streams and lakes of Skamania County are fed by surface water runoff, snowmelt runoff, and groundwater surcharge. The peak flow rates continue into the spring season because of snowmelt affected by the increasing temperature. Shoreline systems in lower elevations are dependent on groundwater discharge to maintain yearly flows. Groundwater generally moves from upland recharge areas toward natural points of discharge into the Columbia River and its larger tributaries (Washington State Department of Ecology 1998a). Groundwater naturally discharges as spring flow or as seepage into streams and lakes and helps control stream and lake temperatures. Developed areas withdraw substantial amounts of groundwater through wells for industrial, public water supply, irrigation, and residential uses, reducing stream flows during the drier parts of the year.

Rainfall contributes to surface water and recharges groundwater as precipitation infiltrates through the soil. While mean annual precipitation varies across the county, the seasonal patterns are consistent with dry summers and wet winters. Winter provides the greatest amount of rainfall, which increases surface water volume, flow velocity, and energy (Washington State Department of Ecology 2012a).

Areas with high infiltration and recharge capacity typically occur in glacial outwash and alluvial valleys such as the Lewis River, Wind River, and Clearwater Creek valleys. These and similar areas west of the Cascade Range may contribute more infiltration and recharge per unit area compared to areas to the east because precipitation is higher to the west of the ridge of the Cascades.

Groundwater discharge occurs in areas containing permeable materials such as glacial outwash and alluvial fan deposits. These permeable deposits can be locations for groundwater discharge for wetlands and streams. Wetland discharge areas west of the Cascade Range identified by DNR include the headwaters of Swift Creek, areas of the Upper Lewis River and Pine Creek, Meadow Creek and its headwaters, areas of the West Fork and Middle Fork of Eagle Creek, and the Columbia River. Important discharge areas east of the Cascade Range include Cascade Creek, Swampy Meadow and Grand Meadow, the headwaters of Mosquito Creek and Meadow Creek, Goose Lake and Forlorn Lake, the Columbia River, the Little White Salmon River, and upper and lower portions of the White Salmon River.

Dynamic hydrogeological processes can cause stream channels to migrate over time (Ecology 2014b). A channel migration zone (CMZ) is defined as the area in which a stream channel has historically occupied and is reasonably likely to move to over a period of time (Ecology 2014b). CMZs are used as a management tool for delineating areas with hazards from migrating stream channels, as well as specifying potential areas for protection and restoration of floodplain habitat (Ward and Stanford, 1995a, Abbe and Montogmery, 1996, Beechie and Bolton, 1999, Collins et al., 2012, *as cited in*

Ecology 2014c). See Section 3.4.3 of this report for more information on channel migration.

Hydrologic processes are also influenced by forest cover in a watershed. Eighty percent of Skamania County is designated national forest area (Skamania County 2007). The forested areas provide a vegetative cover that blocks sunlight and decreases the amount of potential snowmelt. Snowpack provides surface water runoff and/or groundwater recharge sources later into the summer when precipitation slows. Non-forested areas have a higher potential to generate peak runoff, thereby decreasing natural hydrologic processes (Coffin and Harr 1992). Non-forested areas have a lower rate of infiltration, interception, and evapotransporation resulting in increased runoff of rainfall. A significant portion of precipitation falling on non-forested land immediately becomes direct runoff producing high discharges (Reddy 2005). Higher peak flows increase erosion, which makes slopes and river/stream banks less stable. Peak flows entrain soil as it is eroded into the runoff water, which subsequently increases turbidity in surface water, decreasing the water quality for species dependent on low turbidity waters.

Urban development further modifies the land through grading, filling, and increasing the amount of impervious surfaces. Development decreases the amount of rainfall that infiltrates into the subsurface, reducing groundwater recharge (Skamania County 2007). The increase of impervious surface further increases peak runoff, again increasing erosion and turbidity in surface water runoff into lakes, streams and marine water. Urban development that increases impermeable surfaces can increase the entrainment and transport of contaminants potentially present on impermeable surfaces in surface water runoff that can adversely impact surrounding soil, surface water and groundwater. Proper stormwater containment and/or treatment can minimize the adverse impacts of urban development on natural hydrologic processes.

3.4.2 Movement of Sediment, Toxics, Nutrients, and Pathogens

There are few point and non-point sources of pollution in the less populated areas of Skamania County. This factor and the high proportion of public forested lands within the Skamania watersheds result in minimally impacted water quality for the lower populated and forested areas of the County. Skamania County has limited water quality data available for specific watersheds but, in general, the limiting water quality impacts include inputs of pathogens (i.e., fecal coliform), nutrients, increased water temperature, total suspended solids, and turbidity due to agricultural and silviculture practices. The development, construction, and nonpoint-pollution sources found in urban areas also contribute to the degradation of water quality (Skamania County 2005; Washington State Department of Ecology 1997; Skamania County 2007).

The following water bodies in Skamania County are listed on Ecology's 2012 303d list as impaired (Category 4 or 5) based on the criteria described below.

- Bacteria/fecal coliform: Washougal River
- Total dissolved gas (Oxygen): Swift Creek, Lewis River, Columbia River
- Temperature: Bear Creek, Black Creek, Cedar Creek, Clear Creek, Clearwater Creek, Columbia River, Copper Creek , Crater Creek, East Canyon Creek, Eightmile Creek, Falls Creek, Greenhorn Creek, Layout Creek, Lewis River, Little White Salmon River, Little Wind River, Lost Creek, Martha Creek, Muddy River, Ninemile Creek, Pumice Creek, Quartz Creek, Siouxon Creek, Trout Creek, Trout Lake Creek, and Wind River

Turbidity, total dissolved solids, and chemical contaminants were not identified as concerns for water bodies in Skamania County based on Ecology's 303d list for impaired water bodies in Skamania County.

Fecal Coliform

Fecal coliform is used as an indicator of pathogens for water quality standards. Fecal contamination of water is of concern as a threat to human health via incidental ingestion during recreation as well as via direct consumption. Fecal coliform pathogen is monitored in water quality management facilities, such as the Carson Water Treatment Plant in Skamania Couny because it is derived primarily from anthropogenic sources, such as runoff from farms. Natural concentrations of fecal coliform bacteria are naturally very low. Wildlife may contribute directly to waterbodies or indirectly via overland stormwater runoff and be considered the basis for a natural background concentration of fecal coliform (Washington State Department of Ecology 2005b).

Fecal coliform contamination can be one of the most significant water quality problems in streams, lakes, or groundwater. Higher concentration sources of contamination include human waste from untreated or partially untreated discharges from wastewater treatment plants and improperly functioning septic systems, and waste from livestock, wildlife, and domestic animals. Animal operations such as dairy farms are potential sources for fecal coliform. Stormwater runoff may transport fecal matter directly to surface water features. Manure from livestock can be transported to surface water via overland flow during storms, unmanaged animal access, or improper manure storage and disposal.

Processes to remove pathogens from water are mainly based on monitoring data from water quality management facilities. The removal of pathogens in natural systems occurs in standing water through increased filtration and predation by other microbes (U.S. Environmental Protection Agency 2001). Studies by the U.S. Geological Survey indicate that fecal coliform was removed during groundwater transport before being discharged into streams. Thus, the major pathway for

pathogen transport is via surface waters. Pathogen removal is therefore dependent upon areas, such as floodplains and wetlands, which promote water and sediment retention and predation by microorganisms.

The Washougal River is the only water resource in the County on the state's 2012 303(d) -5 list. The Washougal River below Canyon Creek has a required TMDL for bacteria. The associated water samples have met the criterion for bacteria since 2001. The water samples collected in 2002 exceed the percentile criterion for bacteria.

Nutrients

Nutrient cycling within the watershed system is influenced by hydrology and sediment supply. Agricultural, commercial, and residential areas are potential sources of nitrogen, fecal coliform, and other nutrients into the surface water and groundwater systems. Residential yard and garden products such as fertilizers and pesticides; agricultural runoff from pesticides, herbicides, fertilizers, and livestock waste; and chemicals used for commercial forest practices are all sources of nutrients in stormwater runoff that can adversely impact surface and groundwater quality. There is an increase in movement of organic material and nutrients along shoreline systems during the winter because of seasonal variations in in precipitation rates. The higher rates of winter precipitation result in increased runoff during this season.

Riparian areas are important zones for nitrogen fixation and nutrient absorption along the shoreline stream systems. Riparian soils and vegetation provide deposition of sediment and absorption of nutrients in the water column through uptake via their root systems. The soil in these riparian zones contains bacteria that are responsible for denitrification, the process that converts nitrogen to nitrates, making it easier for plants to absorb (Cox et. al 2005). The loss of riparian areas decreases the amount and rate of denitrification in a watershed, potentially increasing the concentration of nutrients in the water column.

When the concentration of nutrients is increased, algal growth can increase, which in turn can decrease the dissolved oxygen available to fish when the vegetation dies off. The three creeks/rivers (Swift Creek, Lewis River, Columbia River [Broughton Reach]) on the 2012 303d list are listed because of dissolved oxygen impairment.

Temperature

Stream and lake temperature is influenced by riparian vegetation, morphology, hydrology, climate, and geographic location. Riparian condition, channel and shore morphology and hydrology are affected by land use activities. For example, urban development that includes increases to impermeable surfaces and clearing of vegetation can decrease infiltration and increase runoff which results in shore and bank erosion. Shore and bank erosion changes stream and lake morphology and riparian conditions at effected locations. Stream and lake temperatures increase

where sheltering vegetation and bank overhang has been removed by development or erosion.

Clearing for timber harvest, the development of residential housing or recreation, commercial and industrial development, and agricultural uses for orchards and nurseries reduce stream surface shading because they decrease riparian vegetation, allowing more solar radiation to reach the stream surface (Tracy et al. 2001). Effective shade is defined as the potential solar shortwave radiation that is blocked by vegetation and topography before it reaches the stream surface. Riparian height, width, and density describe the physical barriers for solar radiation, producing shade. The daily changes in water temperature follow the same pattern as solar radiation entering the water column.

Channel widening (increased the width to depth ratio of a channel) also directly affects the stream temperature by increasing the surface area exposed to solar radiation. Dams, road building, logging of riparian areas, and stream cleanouts of LWD contributed to increased water temperatures in the Wind River watershed (U.S. Forest Service 1996).

Reducing the water volume in a stream can increase its water temperature (Brown 1972) because large volumes of water resist heating and cooling while the temperature in small streams respond rapidly to changes in air temperature or exposure to the sun's rays (Poole, Hicks, and Risley 2001). Water volume decreases during the summer season due to lower precipitation, instream withdrawals and hydraulically connected groundwater withdrawals (Tracy, et. al, 2001). If groundwater contributions increased the volume of water in a stream, the temperature gain would be minimized.

The large forested areas within Skamania County provided shading and protection from increased temperatures in many areas. However, temperature exceedances are the main 303d listed water quality concern for specific water bodies in the County as summarized above. This is because most aquatic organisms, including salmonids, are cold-blooded and are strongly influenced by water temperature (Schuett-Hames et al. 1999). Elevated water temperatures due to land use activities, such as agriculture, flood control, and gravel mining, limit available spawning and rearing habitat for salmonids and other aquatic organisms.

3.4.3 Sediment and Organic Matter Transport Processes

3.4.3.1 Sediment Delivery and Transport

Slopes with erodible soils and areas prone to mass wasting (e.g., landslides, soil creep, rockfalls, debris avalanches, etc.) provide important sediment inputs (e.g., spawning gravels, sand, etc.) for local waterbodies and downstream along the Columbia River and Pacific Coast beaches. Mechanisms forsediment input are closely aligned with geologic controls but are influenced by precipitation and

vegetative cover. As sediments are sorted and move downstream, they create the essential habitats that support a variety of wildlife. For example, gravel sizes play an important role in the suitability of spawning gravels for salmonids and lamprey. Fines and sands that are lighter travel farther downstream and provide spawning grounds for sand rollers and smelt, while slow-moving areas with silts and sands provide refuge for young lamprey while they filter feed and before they migrate to the ocean. When water velocity is reduced, the deposition of fine sediment increases and sediments are stored in depressional areas such as wetlands and lakes and on floodplains.

However, changes in sediment supply have wide-ranging impacts on aquatic ecosystems and can limit ecologic functions by impairing habitat quality and water quality. The naturally occurring sediment supply processes, such as surface erosion and mass wasting, can be altered by human use and result in increased sediment inputs to aquatic ecosystems. Loss of forest cover and road development can increase inputs to aquatic systems by increasing rates of mass wasting and surface erosion. Altered hydrology may also increase streambank erosion inputs to aquatic resources as well as influencing rates of instream transport and storage. Sediment generated from agriculture, mining, and construction sites are other potential sources of sediment to aquatic habitats.

Mass Wasting

Mass wasting, or slope failure, is the downslope movement of rock debris and soil in response to gravitational stresses. Mass wasting occurs when the shear strength or friction no longer resists the force of gravity. The potential for a slope failure increases with steep topography, increases in hydrology, decreases in vegetation, and/or the occurrence of earthquakes. Increases in mass wasting rates attributable to human factors include hillside excavation, water diversions, and changes in vegetative cover. All of these factors are associated with road development. Road development also increases the amount of load that the ground must bear and increases vibrations on the soil and, as a result, is one of the leading contributors to increases in mass wasting rates.

Surface Erosion

Surface erosion is the removal of soil by the flow of water, which usually occurs when particle of soil is carried away by rainfall and overland flow. Surface erosion is a product of vegetative cover, soil organic matter, topography, and precipitation or hydrologic inputs. However, the loss of vegetative cover can lead to increased sediment transport from precipitation and overland flow, resulting in an increase in sediment inputs to aquatic systems, which can be a water quality issue. Soil that is not protected by vegetation and associated root structures will be picked up by overland water flow (erosion) and transported into aquatic systems, increasing turbidity and decreasing water quality of the receiving waters. Land use activities play a major role in increased sediment inputs, especially in the forms of agriculture,

silviculture, mining, residential development, and transportation. Roads within approximately 200 feet of aquatic ecosystems dramatically increase sediment inputs from surface erosion (Beschta 1978). Furthermore, agricultural activities (i.e., till agriculture, bare fallow soil, etc.) can also significantly increase surface erosion to aquatic ecosystems.

Streambank Erosion

Streams, wetlands, and lakes can store sediment before it is transported farther downslope to larger rivers and ultimately to estuaries and oceans. Channelization and floodplain disconnection cause the loss of overbank sediment deposition in the floodplain during high flow events. This in turn causes down-cutting of stream channels, exacerbates the effect, and limits overbank sediment deposition to extremely high flow events. Channelization can consist of widening or deepening of an area of a channel, straightening meanders by dredging, and/or armoring stream banks. These engineered areas of a channel no longer have the same depositional environment that they once had and the general result is increased deposition downstream of channelized areas instead of overbank deposition and storage of sediment. Draining and filling depressional wetlands further reduces the capacity of the landscape to store sediment. These changes in stream morphology resulting from channelization, floodplain disconnect, and down-cutting cause an increase in bank erosion and channel migration rates and yield a decrease in water quality. Increased stream flow velocities from the loss of overbank storage, increased runoff from development, and altered hydrology from dams can also cause channel enlargement and increased bank erosion. Land use activities that result in the loss of native riparian vegetation also increase the susceptibility of streambanks to erosion and ultimately to mass failure.

3.4.3.2 Organic Debris Transport

Organic material enters streams as leaf litter, as LWD from streambank erosion, mass wasting, and windthrow from areas within roughly 200 feet of stream channels. Windthrow is the uprooting and overthrowing of treans by the wind. Sources of LWD from windthrow, tree mortality, stem suppression, and bank erosion/channel migration occur across all types and sizes of streams. Mass wasting is the primary source of LWD in low-order streams (Reeves et al. 2003; Benda et al. 2002). Low-order streams are small headwater streams that are tributaries to larger downstream rivers and streams. River transport and debris-laden floods are important mechanisms of LWD redistribution in large and small streams, respectively.

Loss of intact riparian areas to development, logging, agriculture, etc., can reduce the sources of LWD for streams and ultimately lead to adverse changes in stream channel/habitat-forming processes (Knutson and Naef 1997). In addition, channelizing streams reduces forest cover and decreases the potential for LWD recruitment through bank erosion or channel migration.

4.0 REACH INVENTORY AND ANALYSES

This section expands upon the ecosystem characterization and ecosystem-wide processes information provided in Section 3.0 by describing the shoreline functions and conditions within subwatersheds and reaches of the County's WRIAs. This information is pertinent for the County's future shoreline management and planning efforts. Ecology's SMP guidelines specifies the following requirements for the inventory (WAC 173-26-201(3)(c)):

- Shoreline and adjacent land use patterns and transportation and utility facilities, including the extent of existing structures, impervious surfaces, vegetation, and shoreline modifications in shoreline jurisdiction. Special attention should be paid to identification of ecologically intact blocks of upland vegetation, developed areas with largely intact riparian vegetation, water-oriented uses and related navigation, transportation, and utility facilities. Sections of the County within the GPNF are unzoned. See Section 5.0 of this report for more detail on the existing land use of these unzoned areas according to their GPNF management type.
- Existing aquatic and terrestrial wildlife habitats; native aquatic vegetation; riparian and associated upland plant communities; and critical areas, including wetlands, fish and wildlife habitat conservation areas, geologically hazardous areas, and frequently flooded areas (WAC 173-26-221). Aquifer recharge areas were not available for the County.
- Altered and degraded areas and sites with potential for ecological restoration.
- Areas of special interest, such as priority habitats, ecologically intact late successional native plant communities, developing or redeveloping harbors and waterfronts, previously identified toxic or hazardous material clean-up sites, dredged material disposal sites, or eroding shorelines, to be addressed through new master program provisions.
- Conditions and regulations in shoreline and adjacent areas that affect shorelines, such as surface water management and land use regulations.
- Existing and potential shoreline public access sites, including public rights of way and utility corridors.
- General location of floodplains.
- If the shoreline is rapidly developing or subject to substantial human changes such as clearing and grading, past and current records or historical aerial photographs may be necessary to identify cumulative impacts, such as bulkhead construction, intrusive development on priority and critical habitats, and conversion of harbor areas to non-water-oriented uses.
- Known archeological, cultural, or historical resources. In order to safeguard sensitive information such as the location of archaeological sites and traditional cultural properties, these rwesources are not explicitly mapped in this report.

The total jurisdictional area within the County is 51,947.33 acres. Each of the shoreline areas in the County are grouped according to WRIA and then 12-digit HUC/subwatershed name. The shoreline reaches within each 12-digit HUC/subwatershed where named using their respective stream name. In cases when there were multiple unnamed tributaries within the same stream, the number 1 was added after the stream name at the upstream location and then numbers were added sequentially toward the downstream limits (i.e., 2, 3, 4, etc.). In cases when multiple unnamed waterbodies were within a single 12-digit HUC, they were given numbers. If only one unnamed waterbody existed in a 12-digit HUC, it was simply labelled "Unnamed." See section 2.4 for more information on how stream reaches were identified within the County. The following subsections within section 4.0 are organized in the format of WRIA, 12-digit HUC/subwatershed name, and reaches. This type of organization also provided in Table 5.1, which provides the preliminary shoreline environment designations for each of the reaches within the County. The data sources for the reach inventory analysis, additional information about the attribute, and their respective map number in the Map Folio (Appendix A) are provided in Table 4-1 below. All of the 12 map sets contain 22 map sheets that represent more specific sections of the County. The corresponding map sheet(s) for each 12-digit HUC are also provided in the 12-digit HUC section headers.

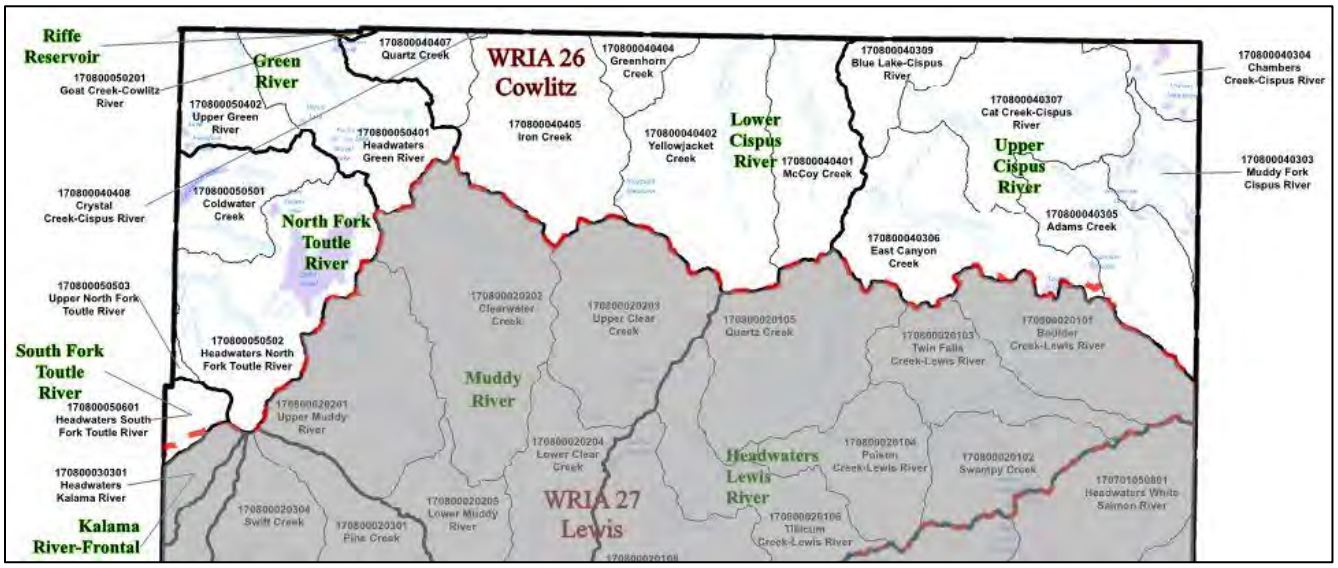
Table 4-1. Attributes and Map Locations

Reach-scale Attribute	Additional Information	Map Number
Preliminary Jurisdiction (by 12-digit HUC)		
WRIA Name	USGS Hydrologic Data	1
12-digit HUC Name and Number	USGS Hydrologic Data	1
Names of all creeks (with minimum 20 c.f.s.) within 12-digit HUC	USGS Hydrologic Data	1
Physical Characteristics (by 12-digit HUC)		
Surficial Geology	Department of Natural Resource (DNR) surface geology dataset was from 1:100,000 scale.	2
Soil Type(s)	USGS Soil Survey Geographic Database (SSURGO) and USFS soil data.	3
Vegetated Cover	USGS Gap analysis program (GAP) data classified into 11 classes.	4
Landslides and Channel Migration Zones	Skamania County, Ecology (not available for WRIA 29 Wind – White Salmon). Landslide Hazard Zones (DNR landslide data from the 1:100,000 and 1:24,000 scale was combined since the 1:24,000 scale was not available for the entire County. Where there was an overlap of coverage, only the 24,000 data was kept). Channel Migration Zones (Ecology CMZ analysis). See Appendix C (Channel Migration Zone Analysis for SMA Streams in Skamania County).	5
Critical Areas (Skamania County Title 21A)		

Reach-scale Attribute	Additional Information	Map Number
Fish and Wildlife Habitat Conservation Areas	WDFW Priority Habitat database WDFW Priority Habitats and Species (PHS) Wildlife WDFW PHS Fish Presence	N/A
Geologic Hazards	Landslide Hazard Zones (DNR landslide data from the 1:100,000 and 1:24,000 scale was combined). See section 6.0 for data gaps). Channel Migration Zones (Ecology data). No data is available for WRIA 29).	N/A
Frequently Flooded Area	FEMA FIRM, Zone A areas. Data was not available for any of the 12-digit HUCs in WRIA 26 Cowlitz.	6
Wetlands, Ponds, Lakes, Streams, Creeks, Rivers	USFWS NWI	6
Land Use (by 12-digit HUC)		
Land Ownership (percent of private vs public)	Public land includes all land owned by federal, state, or local government agencies. “Rights-of-way” were classified as ”Public.” Areas not specifically covered by the parcel dataset (i.e., large portion of the Columbia River), were classified as ”Public."	7
Existing Land Use	Skamania County parcels using Department of Revenue (DOR) code (derived from Assessor's TerraScan database). Some parcels did not have a DOR code assigned, and so were classified as "Unassigned".	8
Zoning	Zoning data was developed by Skamania County and is a compilation of County, National Scenic Area, City of Stevenson, and City of North Bonneville zoning. The data used in this analysis uses generalized zoning classifications whereby approximately 89 actual zoning types countywide are aggregated into 11 general classes.	9
Roads (linear miles)	DNR's road dataset was used for this analysis because it includes the most comprehensive road centerline data for the entire county, including forest roads. No distinction was made between the various types of roads. In addition to the length (miles) of roads per 12-digit HUC, road density was calculated in the form of miles of road per square mile of 12-digit HUC.	10
Impervious Surface (structures and approximate road surface by buffering roads at 30 ft. width)	The DNR road centerline dataset was used to generate an approximate impervious surface related to road infrastructure. Road centerline was buffered to create polygons of impervious surfaces using the following categories: Highways (~0.8 percent of all roads) have a total width of 60 feet; Primary roads (~11 percent of all roads) have a total width of 40 feet; Secondary roads (~88 percent of all roads) have a total width of 30 feet; Four wheel drive roads (~0.2 percent of all roads) have a total width of 20 feet. No distinction could be made between paved vs. gravel roads in the data so all roads were analyzed as impervious. The structures dataset consisted of all known building or other structure footprints in Skamania County as digitized on high resolution	10

Reach-scale Attribute	Additional Information	Map Number
	aerial photos and is generally thought to be current up to the approximate year 2012-2013 based on the aerial photos used.	
Archeological, cultural, and/or historical resources	Washington State Department of Archaeology and Historic Preservation (DAHP) sensitive information. Cultural and historic information comes in the form of GIS point and polygon files.	N/A
Shoreline Modifications (by HUC)		
Bridges	Washington State Department of Transportation bridge inventory. The inventory appears to cover only state highways (i.e., Hwy 14 and 504), and does not include County or other roads.	11
Dams	Ecology dam data.	11
Public Access (by HUC)		
Trails	Trail datasets were merged together to obtain the best available compilation for the full county. The data includes Forest Service trail data covering the Gifford Pinchot National Forest (both terra and snow trails), Washington State Parks trail data (for Beacon Rock State Park), and Skamania County data for trails in the locations of Dog Mt, Cape Horn, and Ozone climbing area.	11
Parks, Golf Courses, and Boat Ramps	Data was developed by Skamania County.	11
Water Quality Impairments (by HUC)		
303(d) Listings	Ecology's 303(d) list.	12
Wellhead Protection	Washington State Department of Health provided this data for wellhead protection areas associated with Group A and Group B wells.	12
State Cleanup Sites and Toxics Release Inventory	Ecology's State Cleanup Sites and Toxics Release Inventory database.	12

4.1 WRIA No. 26



Overall, WRIA 26 - Cowlitz has a drainage basin of approximately 2,492 square miles and includes the Cowlitz River and its tributaries, which drain the region around Mount Rainier, Mount Adams, and Mount St. Helens. WRIA 26 includes approximately 285 square miles within the north portion of Skamania County. The sub basins that are located within the County include the following: North Fork Toutle River, Green River, Lower Cispus River, and the Upper Cispus River with smaller portions of some drainages also in the County. Some of the significant lakes located in the County's portion of WRIA 26 include Deadman's Lake, Venus Lake, Elk Lake, Hanaford Lake, Coldwater Lake, Saint Helen Lake, Spirit Lake, Takhlakh Lake, and Council Lake.

The County's portion of WRIA 26 includes approximately 8,903.76 acres of shoreline jurisdictional area and 84.78 miles of rivers and streams under shoreline jurisdiction (See Appendix A Map 1). The sub-basins of this WRIA are predominantly located on U.S. Forest Service land. Approximately 97 percent of those sub-basins is publicly owned and 3 percent is privately owned as primarily fee-simple in-holding parcels within the GPNF and under active silviculture management (See Appendix A Map 7). The existing land use within the WRIA includes approximately 97 percent government services (e.g., education, public administration, health care, government-owned national forest land)), and less than one percent of each of the following: mining and extraction establishments, construction related business, and agriculture, forestry, fishing, and hunting (See Appendix A Map 8). It has approximately 6,021.88 acres of landslide hazard zones (See Appendix A Map 5). Because the portion of WRIA 26 within the County is mostly forestland, there is little development and alteration to the shoreline area, which mostly exists in a natural condition and supports a variety of fish and wildlife species (See Appendix A Maps 4 & 11). However, a loss of fish access to upstream areas of the Cowlitz River and its

tributaries caused by waterfalls and human-made impassable barriers such as dams has reduced historical runs such as fall-run Chinook, coho salmon, and winter-run and summer-run steelhead salmon within the WRIA (Lower Columbia Fish Recovery Board 2010). Sheets 1, 1a, and 2 of the Appendix A Maps depict the County's portion of WRIA 26.

4.1.1 Muddy Fork - Cispus River (170800040303) – Map Sheet 2

4.1.1.1 Overview

The Muddy Fork – Cispus River HUC (170800040303) is located on the northwest flank of Mount Adams in the northeast portion of the County. This sub basin is approximately 6,315.52 acres and includes 679.93 acres of shoreline jurisdictional area, including 7.3 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3702/-121.5703, and its upstream location is 46.3027/-121.5236 at the County boundary. This HUC includes the Muddy Fork and Spring Creek tributaries to the Cispus River and three lakes. (See Appendix A Map 1).

4.1.1.2 Reach Descriptions

Unnamed Waterbody #1: Located about 3,000 feet west of the Pacific Crest Trail, this shoreline lake is a total of 33.1 acres in size and includes 81.6 acres of both in-water and upland jurisdictional area. This waterbody is the northeastern of two small lakes along the County line and drains to Muddy Fork #1 via associated wetlands. The center of this waterbody is at 46.3016/-121.529. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #2: Located about 3,500 feet west of the Pacific Crest Trail. This shoreline lake is 19.6 acres in size and includes 65.2 acres of shoreline jurisdictional area. This waterbody is the southwestern of two small lakes along the County line and includes associated wetland immediately to its west, southwest, south and southeast. The center of this waterbody is at 46.2946/-121.531. This reach is not a shoreline of statewide significance.

Horseshoe Lake: Located about 5 miles northwest of Mount Adams. This waterbody is 21.3 acres in size and includes 48.2 acres of shoreline jurisdictional area. The center of this waterbody is at 46.3087/-121.569. This reach is not a shoreline of statewide significance.

Muddy Fork Reach #1: From the headwaters at the Mount Adams Lava Glacier to Muddy Fork Reach #2 at the Spring Creek confluence. This reach extends 3.68 stream miles and includes a total of 186 acres of shoreline jurisdictional area including associated wetlands. Its downstream location is 46.3352/-121.5678, and its upstream location is 46.3026/-121.5236. This reach is not a shoreline of statewide significance.

Muddy Fork Reach #2: From Muddy Fork Reach #1 to its confluence with the Cispus River. This reach extends 2.75 total stream miles and includes a total of 129 acres of shoreline jurisdictional area. Its downstream location is 46.3702/-121.5703, and its upstream location is 46.3352/-121.5679. This reach is not a shoreline of statewide significance.

Spring Creek: Spring Creek drains from Horseshoe Lake towards the northwest and into the Cispus River. This reach has 0.88 total stream miles and 86.4 acres of shoreline jurisdictional area including associated wetlands. Its downstream location is 46.3352/-121.5678, and its upstream location is 46.3247/-121.5739. This reach is not a shoreline of statewide significance.

4.1.1.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-2 (See Appendix A Maps 2 and 3).

Table 4-2. Surficial Geology and Soil Types - Muddy Fork - Cispus River (170800040303)

Type	Percent
Surficial Geology	
Basalt	55%
Volcanoclastic deposits or rocks flows	27.3%
Basaltic andesite flows	13.9%
Andesite flows	2.8%
Alluvium, water and landslide deposits	Less than1% each
Soil Types	
Typic vitricryands, Pum	65.9%
Typic vitricryands, Pum, M	17.6%
Aquolls, fibrists, aquods	9.4%
Typic udivitrands, Pum, M, FRG	5.6%
Lithic orthents, andepts, cryands, udands	1.0%

The subwatershed has approximately 3.5 acres of landslide hazard zones. See Appendix A Map 5.

Vegetated land cover within the subwatershed consists of 90.72 percent forested woodland, 4.96 percent recently disturbed or modified land (e.g., harvested timber), 2.65 percent shrubland and/or grassland, 1.34 percent developed other human use, and 0.33 percent open water. See Appendix A Map 4.

4.1.1.4 Biological Resources

The PHS priority habitat types within the subwatershed are freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, and lake. The PHS species within the subwatershed is the northern spotted owl. No federally or state

listed fish presence was identified in the dataset in this subwatershed within Skamania County.

A total of 363 acres of NWI wetlands were identified within the subwatershed. These wetlands include approximately 77 percent forested/shrub, 21.2 percent lake, 15.6 percent freshwater emergent, and 5.5 percent freshwater pond. See Appendix A Map 6.

4.1.1.5 Land Use and Altered Conditions

The only existing land use within this HUC is government services. All of the subwatershed is publicly owned as part of the Gifford Pinchot National Forest and it is entirely unzoned. The subwatershed has approximately 12.47 miles of roads and a road density of 1.26 miles per square mile. It has approximately 2,309,471 square feet (53 acres)of impervious road surfaces, and no additional impervious area for structures.

There are five known archaeological sites within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Unnamed Waterbody #1:
This waterbody is a total of 33.1 acres in size and includes 152.72 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no roads within the reach's shoreline jurisdiction and no impervious surfaces. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #2
This waterbody is 19.6 acres in size and includes 70.77 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no roads within the reach's shoreline jurisdiction and no impervious surfaces. No additional altered conditions are known to be present within this reach.

Horseshoe Lake
This waterbody is 21.3 acres in size and includes 48.2 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach's shoreline jurisdiction has approximately 0.02 miles of roads with 3,237 square feet of impervious area from road surfaces and no impervious structural surfaces.

Muddy Fork #1
This reach has 3.68 total stream miles under shoreline jurisdiction and 186 acres of shoreline jurisdictional area. The only existing land use within this reach is

government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.08 miles of roads within the reach's shoreline jurisdiction. It has 16,365 square feet of impervious road surfaces, and no additional impervious area for structures.

Muddy Fork #2

This reach has 2.75 total stream miles under shoreline jurisdiction and 129 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.41 miles of roads within the reach's shoreline jurisdiction for a total of 74,988 square feet of impervious road surfaces. There are no additional impervious area for structures.

Spring Creek

This reach has 0.88 total stream miles under shoreline jurisdiction and 98.77 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.19 miles of roads within the reach's shoreline jurisdiction for a total of 30,806 square feet of impervious road surfaces. There are no additional impervious area for structures.

4.1.1.6 Public Access

The subwatershed has 20.9 miles of trails, including the Pacific Crest Trail with several viewpoints. It is mostly inaccessible from County roads, but can be accessed from Primary Road 23, to Forest Roads 5601 and 2329 via Highway 12 out of Randle, Washington in Lewis County to the North. No water-oriented or other types of access or recreational development (e.g., boating or picnic facilities, viewpoints) is known to be present in this subwatershed.

4.1.1.7 Restoration Opportunities

Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities such as protecting hillslope processes by planting native riparian vegetation and providing for adequate instream flows during critical periods for the entire subwatershed(Lower Columbia Fish Recovery Board 2010). Road decommissioning is also a potential restoration opportunity within this subwatershed, and may produce aquatic habitat and fish passage improvements (USFS 2016b, Washington Forest Protection Association 2005).

4.1.2 Chambers Creek – Cispus River (170800040304) – Map Sheet 2

4.1.2.1 Overview

The Chambers Creek - Cispus River (170800040304) HUC is approximately 3,890 total acres, and includes 523.93 acres of shoreline jurisdictional area and 2.62 miles of streams under shoreline jurisdiction. Using WGS 84 the subwatershed's downstream

location is 46.3703/-121.5751, and its upstream location is 46.3881/-121.5507. The Chambers Creek- Cispus River HUC is located on the northern flank of Mount Adams in the northeast portion of Skamania County. The subwatershed drains from Midway Meadows to the Cispus River and includes three lakes.

4.1.2.2 Reaches

Cispus River Reach #1: This reach flows northeast to southwest until the confluence of the Muddy Fork. Its downstream location is 46.3702/-121.5703 and its upstream location is 46.3882/-121.5507. This reach is not a shoreline of statewide significance.

Cispus River Reach #2: From the Muddy Fork confluence to the confluence of Pimlico Creek. Its downstream location is 46.3703/-121.5751 and its upstream location is 46.3702/-121.5703. This reach is not a shoreline of statewide significance.

Midway Meadows: Located about 8 miles north of Mount Adams. The center of this waterbody is at 46.3531/-121.5347 and is not a shoreline of statewide significance.

Unnamed Waterbody #1: Located between the Cispus River and Forest Road 56.The center of this waterbody is at 46.3833/-121.5468. This waterbody is not a shoreline of statewide significance.

Unnamed Waterbody #2: Located about 1,300 feet south of Forest Road 21. The center of this waterbody is at 46.3746/-121.5667. This waterbody is not a shoreline of statewide significance.

Unnamed Waterbody #3: Located about 2,000 feet west of Forest Road 2329. The center of this waterbody is at 46.3568/-121.5462. This waterbody is not a shoreline of statewide significance.

4.1.2.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-3.

Table 4-3. Surficial Geology and Soil Types - Chambers Creek – Cispus River (170800040304)

Type	Percent
Surficial Geology	
Volcanoclastic deposits or rocks	38.2%
Alluvium	23.2%
Basalt flow	21.3%
Basaltic andesite flows	12.2%
Tuffs and tuff breccias	2.44%
Andesite flows	1.54%
Intrusive andesite and continental sedimentary deposits or rocks	Less than 1% each
Soil Types	
Typic vitricryands, Pum, M	67.1%

Type	Percent
Typic vitricryands, Pum	13.7%
Aquolls, fibrists, aquods	9.1%
Typic udivitrands, Pum, M,FRG	5.9%
Lithic orthents, andepts, cryands, udands	4.3%

Vegetated cover within the subwatershed is composed of 84.75 percent forested, 13.66 percent recently disturbed or modified land and woodland, 1.07 percent shrubland and/or grassland, and 0.52 percent developed other human use.

4.1.2.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, and freshwater pond. The PHS species within the subwatershed includes the northern spotted owl. The only monitored non-PHS species within the watershed is the coastal tailed frog. Approximately 1.44 stream miles of Cowlitz coastal cutthroat habitat are found within the subwatershed.

Approximately 376 acres of NWI wetlands were identified within the subwatershed. These wetlands are 92 percent freshwater forested/shrub, 7.7 percent freshwater emergent, and less than 1 percent freshwater pond.

4.1.2.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned.

The subwatershed has approximately 14 miles of roads and a road density of 2.3 miles per square mile with 2,560,237 square feet of impervious road surfaces. There are no additional impervious area for structures.

There are seven known archeological sites within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Cispus River Reach #1

This reach has 2.39 stream miles under shoreline jurisdiction and 289.61 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no roads within this reach's shoreline jurisdiction and no impervious surfaces. No additional altered conditions are known to be present within this reach.

Cispus River Reach #2

This reach has 0.23 stream miles under shoreline jurisdiction and 10.8 acres of shoreline jurisdictional area. The only existing land use within this reach is

government services All of the reach is publicly owned and it is entirely unzoned. There are no roads within this reach's shoreline jurisdiction and no impervious surfaces. No additional altered conditions are known to be present within this reach.

Midway Meadows
This reach has a total of 36 acres of shoreline waterbody and 71.54 acres of jurisdictional area. The only existing land use within this reach is government services services – government. All of the reach is publicly owned and it is entirely unzoned. There are 0.98 miles of roads and 177,607 square feet of impervious road surfaces within the reach's shoreline jurisdiction. There is no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #1
This reach has a total of 15.4 acres of shoreline waterbody and 49.3 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.15 miles of roads and 31,028 square feet of impervious area from road surfaces with the reach's shoreline jurisdiction. There are no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #2
This reach has a total of 17.1 acres of shoreline waterbody and 41.2 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no roads or structures in this reach's shoreline jurisdiction and no impervious surfaces. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #3
This reach has a total of 19.3 acres of shoreline waterbody and 61.6 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no roads or structures in this reach's shoreline jurisdiction and no impervious surfaces. No additional altered conditions are known to be present within this reach.

4.1.2.6 Public Access

The subwatershed has 10.7 miles of trails and no boat ramps, golf courses or parks. The subwatershed is accessible from Forest Roads 21 and 56 via Highway 12 out of Randle, Washington.

4.1.2.7 Restoration Opportunities

Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities such as protecting stream corridor and function in the upper reach of the Cispus River and providing for

adequate instream flows during critical periods for the entire subwatershed (Lower Columbia Fish Recovery Board 2010).

4.1.3 Adams Creek (170800040305) – Map Sheet 2

4.1.3.1 Overview

The Adams Creek (170800040305) HUC is approximately 13,376 acres, and includes 568.37 acres of shoreline jurisdictional area and 11.4 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3329/-121.6539. This HUC is located on the northwest flank of Mount Adams in the northeast portion of Skamania County, Washington and includes Adams Creek and a tributary.

4.1.3.2 Reaches

Adams Creek Reach #1: From the headwaters on Mount Adams to the confluence of the Killen Creek tributary. Its downstream location is 46.3046/-121.5842 and its upstream location is 46.2546/121.5585. This reach is not a shoreline of statewide significance.

Adams Creek Reach #2: From the Killen Creek tributary confluence to the Cispus River. Its downstream location is 46.3046/-121.5842 and its upstream location is 46.2546/121.5585. This reach is not a shoreline of statewide significance.

Killen Creek: From the headwaters on Mount Adams to the upper reach of Adams Creek. Its downstream location is 46.3046/-121.5842 and its upstream location is 46.2546/121.5585. This reach is not a shoreline of statewide significance.

4.1.3.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-4. The subwatershed also includes approximately 335.6 acres of landslide hazard zones.

Table 4-4. Surficial Geology and Soil Types - Adams Creek (170800040305)

Type	Percent
Surficial Geology	
Andesite flows	46.7%
Volcanoclastic deposits or rocks	31%
Dacite flows	13.2%
Alpine glacial drift	3.1%
Mass-wasting deposits, mostly landslides	2.2%
Basalt flows	2.1%
Ice, tuffs and tuff breccias, water	Less than 1% each
Soil Types	
Typic vitricryands, Pum	48.2%
Typic udivitrands, Pum, M, FRG	26.9%
Unclassified	10.8%
Lithic orthents, andepts, cryands, udands	6.2%

Type	Percent
Orthents, andepts, cryands	3.5%
Aquolls, fibrists, aquods	2.8%
Typic vitricryands, Pum, M	1.7%

Vegetated cover within the subwatershed is composed of 93.64 percent forested woodland, 2.16 percent nonvascular or sparse vascular rock vegetation, 2.01 percent recently disturbed or modified land, 1.22 percent high montane vegetation 0.51 percent developed and other human use, and 0.35 percent shrubland and/or grassland and 0.11 percent open water.

4.1.3.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, and freshwater pond. The PHS species within the subwatershed is the northern spotted owl. The only monitored non-PHS species within the watershed is the coastal tailed frog (*Ascaphus truei*). Approximately 6.47 stream miles of Cowlitz coastal cutthroat (*Oncorhynchus clarkii clarkii*) habitat are found within the subwatershed.

A total of 274.5 acres of NWI wetlands were identified within the subwatershed. These wetlands include 55.8 percent freshwater forested/shrub, 30.5 percent freshwater emergent and 13.7 percent freshwater pond.

4.1.3.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 14.01 miles of roads with a road density of 0.67 miles per square mile. It has 2,474,353 square feet of impervious road surfaces and does not have any impervious surface from structures. There are 33 known archaeological sites within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Adams Creek Reach #1

This reach has 4.7 total stream miles under shoreline jurisdiction and 228.8 acres of shoreline jurisdictional area. The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.1 miles of roads within the reach's shoreline jurisdiction. It has approximately 20,408 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Adams Creek Reach #2
This reach has 4.5 total stream miles under shoreline jurisdiction and 214.3 acres of shoreline jurisdictional area. The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.34 miles of roads within the reach's shoreline jurisdiction. It has approximately 58,675 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Killen Creek
This reach has 2.2 total stream miles under shoreline jurisdiction and 119.8 acres of shoreline jurisdictional area. The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.2 miles of roads within the reach's shoreline jurisdiction. It has approximately 37,640 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

4.1.3.6 Public Access
The subwatershed has 20.9 miles of trails and no boat ramps, golf courses or parks. The subwatershed is accessible from State Highway 131 (via Highway 12 exit at Randle), continuing onto Forest Service Road 23, then onto Forest Service Roads 21 and 56.

4.1.3.7 Restoration Opportunities
The Cispus River watershed provides salmonid spawning and rearing habitat. Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities including protecting wetlands, riparian and floodplain areas; controlling sediment inputs into the river; maintain adequate riparian buffers; reduce road densities; and stabilize mass wasting to reduce coarse sediment delivery (Washington Forest Protection Association 2005, Washington State Conservation Commission 2000a).

4.1.4 East Canyon Creek (170800040306) – Map Sheet 2

4.1.4.1 Overview
The East Canyon Creek (170800040306) HUC is approximately 18,307 total acres with 632.66 acres of shoreline jurisdictional area, including 10.53 miles of streams and 76.26 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3483/-121.7038. This subwatershed is located within the Gifford Pinchot National Forest, northwest of Mount Adams. The HUC is within the northeast quadrant of Skamania County. This HUC includes East Canyon Creek, two tributaries, and two lakes.

4.1.4.2 Reaches

Dark Creek: This reach begins southeast of Jumbo Peak and flows from southwest to northeast until its confluence with East Canyon Creek. Its downstream location is 46.3120/-121.7326, and its upstream location is 46.3010/-121.7502. This reach is not a shoreline of statewide significance.

East Canyon Creek Reach #1: This reach begins northwest of Council Bluff and continues until the confluence of Summit Prairie Creek. Its downstream location is 46.2987/-121.7232, and its upstream location is 46.2854/-121.6574. This reach is not a shoreline of statewide significance.

East Canyon Creek Reach #2: From the confluence of Summit Prairie Creek to the confluence of Dark Creek. Its downstream location is 46.3120/-121.7326, and its upstream location is 46.2987/-121.7232. This reach is not a shoreline of statewide significance.

East Canyon Creek Reach #3: From the confluence of Dark Creek until its confluence with the Cispus River. Its downstream location is 46.3483/-121.7038, and its upstream location is 46.3120/-121.7326. This reach is not a shoreline of statewide significance.

Summit Prairie Creek: This reach flows from south to north until its confluence with East Canyon Creek. Its downstream location is 46.2987/-121.7232, and its upstream location is 46.2945/-121.7231. This reach is not a shoreline of statewide significance.

Council Lake: This waterbody is located southeast of Council Bluff and west of Babyshoe Ridge. The center of this waterbody is at 46.2667/-121.6295. This reach is not a shoreline of statewide significance.

Takhlakh Lake: This waterbody is located west of Adams Creek and northwest of Babyshoe Pass. The center of this waterbody is at 46.2782/-121.5965. This reach is not a shoreline of statewide significance.

4.1.4.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-5. The subwatershed also includes approximately 1,814.94 acres of landslide hazard zones.

Table 4-5. Surficial Geology and Soil Types - East Canyon Creek (170800040306)

Type	Percent
Surficial Geology	
Andesite flows	42.6%
Tuffs and tuff breccias	23.6%
Volcanoclastic deposits or rocks	20.9%
Intrusive rhyolite	2.9%
Basalt flows	2.7%
Dacite flows	2.4%

Type	Percent
Alluvium	1.9%
Intrusive andesite and dacite	1.4%
Water; Basaltic andesite flows; mass-wasting deposits, mostly landslides; and Rhyolite flows	Less than 1% each
Soil Types	
Typic udivitrands, Pum, M, FRG	55.2%
Lithic orthents, andepts, cryands, udands	19.4%
Typic vitricryands, Pum	12.2%
Typic vitricryands, Pum, M	8.5%
Aquolls, fibrists, aquods	1.3%
Typic udivitrands, Pum /Med-SK, FRG; Vitric haplocryands, Cind/Med; Lithic orthents; and Aquic vitricryands, Pum	Less than one %

Vegetated cover within the subwatershed is composed of 87.2 percent forested woodland, 10.9 percent recently disturbed or modified land, 1.3 percent developed other human use, and less than one percent of each: nonvascular or sparse vascular rock vegetation, open water, and shrubland and/or grassland.

4.1.4.4 Biological Resources

The PHS habitats within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, lake, and riverine wetland. The PHS species within the subwatershed include northern spotted owl, northern goshawk, western toad, gray wolf, and Larch Mountain salamander. The monitored non-PHS species within the subwatershed include tailed frog, Cascades frog, and Cope's giant salamander.

Approximately 6.47 stream miles of Cowlitz coastal cutthroat habitat, 0.08 stream miles of Cowlitz winter steelhead habitat, and 0.06 stream miles of Cowlitz fall Chinook are found within the subwatershed. Cutthroat spawn from January to April and most juveniles rear 2 to 3 years before migrating from their natal stream. Fall Chinook spawn between September and November and winter steelhead spawn between early March and early June (Lower Columbia Fish Recovery Board 2010).

A total of 256.5 acres of NWI wetlands were identified within the subwatershed. These wetlands include 35.3 percent freshwater forested/shrub wetland, 30 percent freshwater emergent wetland, 29.7 percent lake, 5.3 percent riverine wetland, and less than one percent freshwater pond.

4.1.4.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 50.3 miles of roads with a road density of 1.76 miles per square mile. It has approximately 8,601,166 square feet of impervious road surfaces and no additional

impervious structural surfaces. Known archaeological, cultural, or historical resources within the subwatershed include 11 archaeological sites.

The subwatershed has one wellhead protection area associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Dark Creek
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach's shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

East Canyon Creek Reach #1
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.82 miles of roads within the reach's shoreline jurisdiction. It has approximately 158,164 square feet of impervious road surfaces and no additional impervious area of structures. No additional altered conditions are known to be present within this reach.

East Canyon Creek Reach #2
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 1.03 miles of roads within the reach's shoreline jurisdiction. It has approximately 216,390 square feet of impervious road surfaces and no additional impervious area of structures. No additional altered conditions are known to be present within this reach.

East Canyon Creek Reach #3
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.46 miles of roads within the reach's shoreline jurisdiction. It has approximately 83,129 square feet of impervious road surfaces and no additional impervious area of structures. This reach has a State 303d listing associated with temperature. No additional altered conditions are known to be present within this reach.

Summit Prairie Creek
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach's shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Council Lake
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach has approximately 0.03 miles of roads and a road density of 0.25 miles per square mile within the shoreline jurisdiction. It has approximately 4,601 square feet of impervious road surfaces and no additional impervious area of structures. No additional altered conditions are known to be present within this reach.

Takhlakh Lake
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach has approximately 0.10 miles of roads and a road density of 1.16 miles per square mile within the shoreline jurisdiction. It has approximately 15,940 square feet of impervious road surfaces and no additional impervious area of structures. This lake has a wellhead protection area. No additional altered conditions are known to be present within this reach.

4.1.4.6 Public Access
The subwatershed has 19.82 miles of trails including the Takhlakh Loop Trail that runs along the perimeter of Takhlakh Lake. The subwatershed is fairly accessible from Forest Service roads including Forest Service Road NF-23 that runs parallel to East Canyon Creek.

4.1.4.7 Restoration Opportunities
Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities such as increasing riparian shading and decreasing channel width-to-depth ratios to restore degraded water quality related to temperature impairments within East Canyon Creek. East Canyon Creek is also an area of concern for poor riparian conditions and opportunities may include the removal of invasive and exotic species and restoring the natural riparian plant community (Lower Columbia Fish Recovery Board 2010).

4.1.5 Cat Creek – Cispus River (170800040307) – Map Sheet 2

4.1.5.1 Overview
The Cat Creek – Cispus River (170800040307) HUC is approximately 18,136 total acres with 594.27 acres of shoreline jurisdictional area, including 12.34 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3664/-121.7300, and its upstream location is 46.3490/-121.6243. The Cat Creek – Cispus River HUC is located in the northeast corner of Skamania County and entirely within the Gifford Pinchot National Forest. This HUC is approximately 14 miles northwest from Mount Adams.

4.1.5.2 Reaches
Cispus River Reach #3: This reach originates at the confluence with the Muddy Fork River and ends at the confluence with Cat Creek. Its downstream location is

46.3490/-121.6243, and its upstream location is 46.3703/-1215751. This reach is not a shoreline of statewide significance.

Cispus River Reach #4: This reach originates at the confluence with Cat Creek and ends at the confluence with Adams Creek. Its downstream location is 46.3329/-121.6539, and its upstream location is 46.3490/-121.6243. This reach is not a shoreline of statewide significance.

Cispus River Reach #5: This reach originates at the confluence with Adams Creek and ends approximately 3.27 stream miles downstream at the confluence with East Canyon Creek. Its downstream location is 46.3482/-121.7038, and its upstream location is 46.3329/-121.6539. This reach is not a shoreline of statewide significance.

Cispus River Reach #6: This reach originates at the confluence with East Canyon Creek and ends at the confluence with Prospect Creek. Its downstream location is 46.3664/-121.7300, and its upstream location is 46.3483/-121.7038. This reach is not a shoreline of statewide significance.

Cat Creek: This reach originates approximately at the junction of NF-78 and NF-120 and ends at the confluence with Cispus River Reach #3. Its downstream location is 46.34904/-121.6243, and its upstream location is 46.3664/-121.6255. This reach is not a shoreline of statewide significance.

4.1.5.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-6. The subwatershed also includes approximately 502 acres of landslide hazard zones.

Table 4-6. Surficial Geology and Soil Types - Cat Creek – Cispus River (170800040307)

Type	Percent
Surficial Geology	
Volcaniclastic deposits or rocks	61.71%
Basalt flows	21.23%
Alluvium	3.61%
Diorite	2.95%
Quartz diorite	2.65%
Intrusive rhyolite	2.46%
Intrusive andesite	1.68%
Tuffs and tuff breccias	1.52%
Andesite flows	1.19%
Alpine glacial drift, Fraser-age	0.72%
Rhyolite flows	0.22%
water	0.04%
Soil Types	
Typic utdivitrands, PUM, M, FRG	64.24%
Typic utdivitrands, PUM, M	23.85%

Type	Percent
Lithic orthents, andepts, cryands, udands	6.21%
Aquolls, fibrists, aquods; Typic udivitrands, PUM/MED-SK, FRG; Typic vitricryands, PUM	Less than 1% each

Vegetated cover within the subwatershed is composed of 78.64 percent forested woodland, 20.67 percent recently disturbed or modified land, 0.62 percent developed other human use, 0.04 percent open water, 0.02 percent nonvascular or sparse vascular rock vegetation, and 0.01 percent shrubland and/or grassland.

4.1.5.4 Biological Resources

The priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, frewshwater pond, and riverine wetland. The PHS species within the subwatershed include northern spotted owl, northern goshawk, fisher, and Larch Mountain salamander. The monitored non-PHS species within the subwatershed include tailed frog and cascades frog.

Approximately 3.11 stream miles of Cowlitz fall Chinook, 3.10 stream miles of Cowlitz winter steelhead, and 2.52 stream miles of Cowlitz coastal cutthroat habitat are found within the subwatershed.

A total of 153 acres of NWI wetlands were identified within the subwatershed. These wetlands include 86.02 percent freshwater forested/shrub wetland, 5.17 percent freshwater pond, 4.59 percent freshwater emergent wetland, and 4.21 percent riverine wetland.

4.1.5.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 64.84 miles of roads with a road density of 2.29 miles per square mile. The subwatershed has approximately 11,153,908 total square feet of impervious road surfaces. There are 19 archaeological sites within the subwatershed.

The subwatershed has seven wellhead protection areas associated with Group A and Group B wells. There are no 303(d) listings and state cleanup site listings within the watershed.

Cispus River Reach #3

This reach has 3.28 total stream miles under shoreline jurisdiction and 157 acres of shoreline jurisdictional area. The existing land use within this reach is entirely government services. All of the reach is publicly owned and it is entirely unzoned. The reach's shoreline jurisdiction has approximately 0.44 miles of roads and a road density of 1.8 miles per square mile. It has approximately 71,623 total square feet of impervious road surfaces.

Cispus River Reach #4
This reach has 2.35 total stream miles under shoreline jurisdiction and 115 acres of shoreline jurisdictional area. The existing land use within this reach is entirely government services. All of the reach is publicly owned and it is entirely unzoned. The reach has approximately 0.29 miles of roads and a road density of 1.61 miles per square mile. It has approximately 54,823 total square feet of impervious road surfaces.

Cispus River Reach #5
This reach has 3.27 total stream miles under shoreline jurisdiction and 156 acres of shoreline jurisdictional area. The existing land use within this reach is entirely government services. All of the reach is publicly owned and it is entirely unzoned. The reach has approximately 0.44 miles of roads and a road density of 1.80 miles per square mile. It has approximately 77,111 total square feet of impervious road surfaces.

Cispus River Reach #6
This reach has 2.05 total stream miles under shoreline jurisdiction and 99.55 acres of shoreline jurisdictional area. The existing land use within this reach is entirely government services. All of the reach is publicly owned and it is entirely unzoned. The reach has approximately 0.25 miles of roads and a road density of 1.59 miles per square mile. It has approximately 43,060 total square feet of impervious road surfaces.

Cat Creek
This reach has 1.40 total stream miles under shoreline jurisdiction and 67.75 acres of shoreline jurisdictional area. The existing land use within this reach is entirely government services. All of the reach is publicly owned and it is entirely unzoned. The reach has approximately 0.42 miles of roads and a road density of 3.96 miles per square mile. It has approximately 71,623 total square feet of impervious road surfaces.

4.1.5.6 Public Access
The subwatershed has 29.18 miles of trails. Access to the subwatershed is limited since there are only unpaved forest roads within the subwatershed.

4.1.5.7 Restoration Opportunities
The Cispus River provides spawning and rearing habitat within this subwatershed. Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities including land use planning that protects wetland, riparian and floodplain areas, controlling sediment inputs into the river, maintain adequate riparian buffers, reduce road densities, stabilize mass wasting to reduce coarse sediment delivery, install large woody debris (LWD) to provide cover for juvenile fish shelter, and increase side-channel, tributaries, and

alcove habitat for coho rearing (USFS 2016b, Washington Forest Protection Association 2005, Washington State Conservation Commission 2000a).

4.1.6 Blue Lake – Cispus River (170800040309) – Map Sheet 2

4.1.6.1 Overview

The Blue Lake - Cispus River (170800040309) HUC is approximately 6,261.9 total acres and includes 105.9 acres of shoreline jurisdictional area, including 1.9 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3877/-121.7398. The Blue Lake – Cispus River HUC is located about 15 miles northwest of Mount Adams and extends into Lewis County to the north.

4.1.6.2 Reaches

Cispus River Reach #7: From the confluence of Prospect Creek this reach extends to the County boundary. Its downstream location is 46.3877/-121.7398 and its upstream location is 46.3664/-121.7300. This reach is not a shoreline of statewide significance.

4.1.6.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-7. The subwatershed also includes approximately 144.14 acres of landslide hazard zones.

Table 4-7. Surficial Geology and Soil Types - Blue Lake – Cispus River (170800040309)

Type	Percent
Surficial Geology	
Volcanoclastic deposits or rocks	65.82%
Tuffs and tuff breccias	8.49%
Intrusive andesite and dacite	6.67%
Alluvium	6.33%
Andesite flows	5.66%
Intrusive rhyolite	5.03%
Basalt flows	1.71%
Alpine glacial drift, Fraser-age	0.29%
Soil Types	
Typic udivitrands, Pum, M, FRG	74.6%
Lithic orthents, andepts, cryands, udands	21.3%
Typic vitricryands, Pum, M	1.9%
Typic vitricryands, Pum	1.4%
Aquic vitricryands, Pum; and aquolls, fibrists, aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 95.09 percent forested woodland, 2.94 percent recently disturbed or modified land, 1.54 percent shrubland and/or grassland, 0.26 percent developed other human use, and 0.17 percent nonvascular or sparse vascular rock vegetation.

4.1.6.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, and riverine wetland. The PHS species within the subwatershed is the northern spotted owl. Approximately 1.91 stream miles of Cowlitz fall Chinook habitat and 2.24 stream miles of Cowlitz winter steelhead habitat are found within the subwatershed.

A total of 62.9 acres of NWI wetlands were identified within the subwatershed. These wetlands include 75.4 percent freshwater forested/shrub, 17.8 percent riverine wetland, and 6.9 percent freshwater emergent wetlands.

4.1.6.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 11.09 miles of roads and a road density of 1.13 miles per square mile. The subwatershed has approximately 1,884,351 square feet of impervious road surfaces and no impervious structures. There are four known archaeological sites within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Cispus River Reach #7

This reach has 1.93 total stream miles under shoreline jurisdiction and 105.9 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. This reach's shoreline jurisdiction has about 2,075 square feet of impervious surfaces from roads and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

4.1.6.6 Public Access

There are no trails, boat ramps, golf courses or parks in this subwatershed. It is accessible from State Highway 131 (via Highway 12 exit at Randle) and onto Forest Service Road 23.

4.1.6.7 Restoration Opportunities

The Cispus River provides spawning and rearing habitat within this subwatershed. Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities including land use planning that protects wetland, riparian and floodplain areas, controlling sediment inputs into the river, maintain adequate riparian buffers, reduce road densities, stabilize mass wasting to reduce coarse sediment delivery, install large woody debris (LWD) to provide cover for juvenile fish shelter, and increase side-channel, tributaries, and alcove habitat for coho rearing (USFS 2016b, Washington Forest Protection Association 2005, Washington State Conservation Commission 2000a).

4.1.7 McCoy Creek (170800040401) – Map Sheet 2

4.1.7.1 Overview

The McCoy Creek (170800040401) HUC is approximately 12,424 total acres and includes 321.6 acres of shoreline jurisdictional area including 6.68 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3876/-121.8189. The subwatershed is located within the Gifford Pinchot National Forest and within the northwest quadrant of the county, extending into Lewis County to the north.

4.1.7.2 Reaches

McCoy Creek: This reach begins just west of Jumbo Peak, flows between McCoy Peak and Sunrise Peak, and continues until the county boundary to the north. Its downstream location is 46.3876/-121.8189, and its upstream location is 46.3060/-121.7960. This reach is not a shoreline of statewide significance.

4.1.7.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-8. The subwatershed also includes approximately 220.52 acres of landslide hazard zones.

Table 4-8. Surficial Geology and Soil Types - McCoy Creek (170800040401)

Type	Percent
Surficial Geology	
Volcanoclastic deposits or rocks	44.7%
Tuffs and tuff breccias	35.5%
Andesite flows	10.4%
Intrusive andesite and dacite	5.6%
Quartz diorite	3.0%
Intrusive andesite	Less than 1% each
Soil Types	
Typic udivitrands, Pum, M, FRG	58.0%
Lithic orthents, andepts, cryands, and udands	39.5%
Lithic orthents	1.8%
Typic vitricryands, Pum, M; and Typic udivitrands, Pum/Med-SK, FRG	Less than 1% each

Vegetated cover within the subwatershed is composed of 90.3 percent forested woodland, 5.9 percent recently disturbed or modified land, 3.5 percent shrubland and/or grassland, and less than one percent developed other human use and nonvascular or sparse vascular rock vegetation.

4.1.7.4 Biological Resources

The PHS habitats within the subwatershed include freshwater forested/shrub wetland, freshwater pond, and "other" type of wetland. The PHS species within the

subwatershed include northern spotted owl and northern goshawk. The monitored non-PHS species within the subwatershed include the tailed frog.

Approximately 4.44 stream miles of Cowlitz coastal cutthroat habitat are found within the subwatershed. Cutthroat spawn from January to April and most juveniles rear 2 to 3 years before migrating from their natal stream (Lower Columbia Fish Recovery Board 2010).

Approximately 1 acre of NWI wetlands were identified within the subwatershed. These wetlands include 46.9 percent freshwater forested/shrub wetland, 31.5 percent freshwater pond, and 21.7 wetland classified as other.

4.1.7.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of the subwatershed is publicly owned and it is entirely unzoned. It has approximately 21.15 miles of roads with a road density of 1.09 miles per square mile. There are approximately 3,335,373 square feet of impervious road surfaces and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include five historic properties and 13 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

McCoy Creek

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.52 miles of roads within the reach's shoreline jurisdiction with approximately 86,434 square feet of impervious road surfaces and no additional impervious areas from structures. No additional altered conditions are known to be present within this reach.

4.1.7.6 Public Access

The subwatershed has 15.28 miles of trails. Forest service roads provide access throughout the subwatershed and forest service road NF-29 runs parallel to McCoy Creek.

4.1.7.7 Restoration Opportunities

Ecological conditions in this subwatershed are generally in good condition, but McCoy Creek is an area of concern for poor riparian conditions and the upper reaches are rated impaired for sediment conditions. Restoration opportunities to improve riparian conditions include the removal of invasive and exotic species and restoring the natural riparian plant community; while opportunities to improve sediment conditions may include the removal or upgrading of problem forest service

roads (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.1.8 Yellowjacket Creek (170800040402) – Map Sheet 2

4.1.8.1 Overview

The Yellowjacket Creek (170800040402) HUC is approximately 21,951.04 total acres within Skamania County and extends north into Lewis County. The portion of the HUC within the County includes 445.83 acres of shoreline jurisdictional area with 8.55 miles of streams and 17.48 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3876/-121.8321. The subwatershed is located within the Gifford Pinchot National Forest and within the northern-central portion of the county.

4.1.8.2 Reaches

Yellowjacket Creek: The reach flows south to north starting north of Craggy Peak until the County boundary. Its downstream location is 46.3876/-121.8321, and its upstream location is 46.2896/-121.8410. This reach is not a shoreline of statewide significance.

Mosquito Meadows: This waterbody is located between the non-jurisdictional Twelvemile Creek and Pinto Creek. The center of this waterbody is at 46.3080/-121.9304. This reach is not a shoreline of statewide significance.

4.1.8.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-9. The subwatershed also includes approximately 343.4 acres of landslide hazard zones.

Table 4-9. Surficial Geology and Soil Types - Yellowjacket Creek (170800040402)

Type	Percent
Surficial Geology	
Volcanoclastic deposits or rocks	25.0%
Tuffs and tuff breccias	24.7%
Andesite flows	23.2%
Basalt flows	12.6%
Basaltic andesite flows	11.3%
Diorite	1.3%
Alpine glacial drift; intrusive rocks, undivided; intrusive andesite and dacite; mass-wasting deposits, mostly landslides; and gabbro	Less than 1% each
Soil Types	
Typic udivitrands, Pum, M, FRG	39.7%
Vitric haplocryands, Cind/Med	23.7%
Lithic orthents, andepts, cryands, udands	22.0%
Typic udivitrands, Cind/Med, FRG	9.1%
Typic vitricryands, Pum, M	1.5%

Type	Percent
Typic udivitrands, Pum /S-SK, FRG	1.4%
Typic vitricryands, Pum	1.4%
Lithic orthents; and aquolls, fibrists, and aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 86.5 percent forested woodland, 12.3 percent recently disturbed or modified land, and less than one percent developed other human use, nonvascular or sparse vascular rock vegetation, and shrubland and/or grassland.

4.1.8.4 Biological Resources

The PHS habitats within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, and "other" type of wetland. The PHS species within the subwatershed include northern spotted owl, northern goshawk, western toad, harlequin duck, fisher, Larch Mountain salamander, Van Dyke's salamander, and Cascade torrent salamander. The monitored non-PHS species within the subwatershed include tailed frog, Cascades frog, and Cope's giant salamander.

Approximately 11.92 stream miles of Cowlitz coastal cutthroat habitat, 0.21 stream miles of Cowlitz fall Chinook habitat, and 0.19 stream miles of Cowlitz winter steelhead habitat are found within the subwatershed. Cutthroat spawn from January to April and most juveniles rear 2 to 3 years before migrating from their natal stream. Fall Chinook spawn between September and November and winter steelhead spawn between early March and early June (Lower Columbia Fish Recovery Board 2010).

A total of 39.76 acres of NWI wetlands were identified within the subwatershed. These wetlands include 71.7 percent freshwater forested/shrub wetland, 22.4 percent freshwater emergent wetland, 3.1 percent other, and 2.7 percent freshwater pond.

4.1.8.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 71.59 miles of roads with a road density of 2.09 miles per square mile. It has approximately 11,284,449 square feet of impervious road surfaces and no additional impervious area of structures.

Known archaeological, cultural, or historical resources within the subwatershed include 13 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within the subwatershed. There are no State 303d listings within this subwatershed.

Yellowjacket Creek

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 1.77 miles of roads within the reach's shoreline jurisdiction. It has approximately 279,966 square feet of impervious road surfaces and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Mosquito Meadows

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach's shoreline jurisdiction has approximately 0.12 miles of roads with a road density of 2.04 miles per square mile. It has approximately 19,126 square feet of impervious road surfaces and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

4.1.8.6 Public Access

The subwatershed has 8.39 miles of trails and can be accessed from forest service roads accessed via the main forest service seasonal road - 2515 Road.

4.1.8.7 Restoration Opportunities

Hydrologic conditions in Yellowjacket Creek are generally in good condition but emphasis should be placed on preservation of basin-wide watershed process conditions including runoff and sediment supply. Upgrading or removing forest roads may decrease impacts related to sediment supply, water quality, and runoff processes. Restoration opportunities may include increasing riparian shading and decreasing channel width-to-depth ratios to restore degraded water quality related to temperature impairments within Yellowjacket Creek (Lower Columbia Fish Recovery Board 2010).

4.1.9 Greenhorn Creek (170800040404) – Map Sheet 1

4.1.9.1 Overview

The Greenhorn Creek (170800040404) HUC is approximately 3,942.22 total acres within Skamania County and does not include any waterbodies that meet shoreline jurisdiction criteria. The subwatershed extends into Lewis County to the north. The portion of the HUC is located within the Gifford Pinchot National Forest and is located north of French Butte.

4.1.9.2 Reaches

This subwatershed has no shoreline reaches in Skamania County.

4.1.9.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-10. The subwatershed also includes approximately 10.11 acres of landslide hazard zones.

Table 4-10. Surficial Geology and Soil Types - Greenhorn Creek (170800040404)

Type	Percent
Surficial Geology	
Basaltic andesite flows	52.6%
Tuffs and tuff breccias	44.8%
Andesite flows	1.4%
Intrusive andesite; mass-wasting deposits, mostly landslides; and dacite flows	Less than 1% each
Soil Types	
Vitric haplocryands, Cind/Med	61.5%
Typic udivitrands, Cind/Med, FRG	19.5%
Lithic orthents, andepts, cryands, udands	12.8%
Typic udivitrands, Pum, M, frg	4.8%
Aquic vitricryands, Ashy/Med-SK	1.2%
Aquolls, fibrists, and aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 80.7 percent forested woodland, 16.9 percent recently disturbed or modified land, 1.8 percent shrubland and/or grassland, and less than one percent developed other human use.

4.1.9.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland and habitat for elk. The PHS species within the subwatershed include northern spotted owl. The monitored non-PHS species within the subwatershed include the tailed frog. A total of 1.11 acres of NWI wetlands were identified within the subwatershed. These wetlands are entirely freshwater forested/shrub wetlands.

4.1.9.5 Land Use and Altered Conditions

The only existing land use within Greenhorn Creek is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 17.01 miles of roads and with a road density of 2.76 miles per square mile. It has approximately 2,938,304 square feet of impervious road surfaces and no additional impervious area from structures.Known archaeological, cultural, or historical resources within the subwatershed include nine archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within the subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the watershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

4.1.9.6 Public Access

The subwatershed has one mile of trails. The subwatershed is accessible from forest service roads accessed via the main forest service seasonal road (2515 Road), located to the west of the subwatershed.

4.1.9.7 Restoration Opportunities

Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities within the subwatershed such as upgrading or removing problem forest roads or reforesting heavily cut areas not recovering naturally (Washington Forest Protection Association 2005). These measures will restore degraded hillslope processes and reduce stormwater runoff and watershed imperviousness (Lower Columbia Fish Recovery Board 2010).

4.1.10 Iron Creek (170800040405) – Map Sheet 1

4.1.10.1 Overview

The Iron Creek (170800040405) HUC is approximately 19,561.02 acres within Skamania County and does not include any waterbodies that meet shoreline jurisdiction criteria. The subwatershed extends into Lewis County to the north. The portion of the HUC is located within the Gifford Pinchot National Forest and is located east of Strawberry Mountain.

4.1.10.2 Reaches

This subwatershed has no shoreline reaches in Skamania County.

4.1.10.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-11. The subwatershed also includes approximately 1,905.6 acres of landslide hazard zones.

Table 4-11. Surficial Geology and Soil Types - Iron Creek (170800040405)

Type	Percent
Surficial Geology	
Tuffs and tuff breccias	35.5%
Andesite flows	24.9%
Dacite flows	15.7%
Volcanoclastic deposits or rocks	11.8%
Basaltic andesite flows	7.8%
Mass-wasting deposits, mostly landslides	2.0%
Alpine glacial drift; Alpine glacial till; and alluvium	Less than 1% each
Soil Types	
Typic udivitrands, Cind/Med, FRG	65.2%
Vitric haplocryands, Cind/Med	13.5%
Typic udivitrands, Pum, M, FRG	12.8%
Lithic orthents, andepts, cryands, udands	7.2%
Aquic vitricryands, Ashy/Med-SK; Aquolls, fibrists, and aquods; and Lithic orthents	Less than 1% each

Vegetated cover within the subwatershed is composed of 58.7 percent forested woodland, 39.3 percent recently disturbed or modified land, 1.2 percent developed

other human use, and less than one percent nonvascular or sparse vascular rock vegetation and shrubland and/or grassland.

4.1.10.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, and habitat for elk. The PHS species within the subwatershed include northern spotted owl, western toad, Larch Mountain salamander, and Cascade torrent salamander. The monitored non-PHS species within the subwatershed include tailed frog, Cascades frog, and Cope's giant salamander.

Approximately 0.06 stream miles of Cowlitz coastal cutthroat habitat are found within the subwatershed. Cutthroat spawn from January to April and most juveniles rear 2 to 3 years before migrating from their natal stream (Lower Columbia Fish Recovery Board 2010).

A total of 17.54 acres of NWI wetlands were identified within the subwatershed. These wetlands include 93.5 percent freshwater forested/shrub wetland and 6.5 percent freshwater emergent wetland.

4.1.10.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 99.2 percent government services and less than one percent mining and extraction establishments. Approximately 99.2 percent is publicly owned and less than one percent is privately owned by Port Blakely Tree Farms LP as a fee simple in-holder parcel with mining and extraction establishments land uses. In terms of zoning, the watershed is entirely unzoned.

The subwatershed has approximately 115.85 miles of roads with a road density of 3.79 miles per square mile. It has approximately 18,873,680 square feet of impervious road surfaces and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 11 archaeological sites.The subwatershed has one wellhead protection area associated with Group A and Group B wells. There are no State 303d listings within this subwatershed.

4.1.10.6 Public Access

The subwatershed has 6.62 miles of trails. The subwatershed is fairly accessible from forest service roads accessed via the main forest service seasonal road - 2515 Road.

4.1.10.7 Restoration Opportunities

Ecological conditions in this subwatershed are generally in good condition, but emphasis should be placed on restoration opportunities within the subwatershed such as upgrading or removing problem forest roads or reforesting heavily cut areas

not recovering naturally (Washington Forest Protection Association 2005). These measures will restore degraded hillslope processes and reduce stormwater runoff and watershed imperviousness (Lower Columbia Fish Recovery Board 2010).

4.1.11 Quartz Creek (170800040407) – Map Sheet 1

4.1.11.1 Overview

The Quartz Creek (170800040407) HUC is approximately 5,845 total acres, and includes only 21.71 acres of shoreline jurisdictional area and 0.42 miles of stream within the County. Using the WGS 84, the subwatershed's downstream location is 46.3880/-122.0693. The very small portion of this subwatershed is located in the northwest quadrant of Skamania County and extends into Lewis County to the north. The reach is located in the Gifford Pinchot National Forest and west of Strawberry Mountain.

4.1.11.2 Reaches

Quartz Creek: This reach flows south to north and continues until the county boundary just downstream of the confluence of Red Spring Creek. Its downstream location is 46.3880/-122.0693, and its upstream location is 46.3822/-122.0698. This reach is not a shoreline of statewide significance.

4.1.11.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-12.

Table 4-12. Surficial Geology and Soil Types - Quartz Creek (170800040407)

Type	Percent
Surficial Geology	
Quartz diorite	39.9%
Quartz monzonite	31.3%
Andesite flows	17.5%
Argillic alteration	5.4%
Alluvium	3.3%
Dacite flows	2.0%
Alpine glacial till, pre-Fraser; and volcanoclastic deposits or rocks	Less than 1% each
Soil Types	
Typic udivitrands, CIND/MED, FRG	23.6
Colter cindery sandy loam, 65 to 90 % slopes	21.6
Rock outcrop-Cattcreek complex, cold, 65 to 90 % slopes	12.5
Benham very cindery sandy loam, 0 to 30 % slopes	7.7
Colter cindery sandy loam, 30 to 65 % slopes	6.7
Lithic orthents, andepts, cryands, udands	4.5
Colter cindery sandy loam, cold, 30 to 65 % slopes	4.1
Benham very cindery sandy loam, 30 to 65 % slopes	3.9
Colter loamy sand, overblown, 30 to 65 % slopes	2.8
Minniepeak loamy sand, overblown, 5 to 30 % slopes	2.2

Type	Percent
Tradedollar sandy loam, 0 to 30 % slopes	2.0
Elkprairie loamy sand, 5 to 30 % slopes	1.7
Colter cindery sandy loam, 0 to 30 % slopes	1.6
Minniepeak extremely cindery loamy sand, overblown, 65 to 90 % slopes	1.6
Colter cindery sandy loam, cold, 0 to 30 % slopes	1.4
Minniepeak extremely cindery loamy sand, overblown, 30 to 65 % slopes; Colter loamy sand, overblown, 0 to 30 % slopes; Colter cindery sandy loam, cold, 65 to 90 % slopes; water; Cattcreek very cindery loamy sand, cold, 30 to 65 % slopes; and Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90 % slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 72.5 percent forested woodland, 26.5 percent recently disturbed or modified land, and less than one percent developed other human use, and shrubland and/or grassland.

4.1.11.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater pond, riverine wetland, and habitat for elk. The PHS species within the subwatershed include the northern spotted owl. The monitored non-PHS species within the subwatershed include the tailed frog. Approximately 3.92 stream miles of Cowlitz coastal cutthroat are found within the subwatershed. Upper Quartz Creek has poor riparian conditions due to impacts of the 1980 Mount St. Helens eruption.

A total of 9.58 acres of NWI wetlands were identified within the subwatershed. These wetlands include 60.2 percent freshwater pond, 35.1 percent freshwater forested shrub wetland, and 4.7 percent riverine wetland.

4.1.11.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

The subwatershed has approximately 18.99 miles of roads and a road density of 2.08 miles per square mile. It has approximately 3,211,863 square feet of impervious road surfaces, and no additional impervious area for structures.

Known archaeological, cultural, or historical resources within the subwatershed includes four archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Quartz Creek

This reach has 0.42 total stream miles under shoreline jurisdiction and 21.71 acres of shoreline jurisdictional area. The only existing land use within this reach isgovernment services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.10 miles of roads within the reach. It has approximately 15,005 square feet of impervious road surfaces, and no additional impervious area for structures.

4.1.11.6 Public Access

The subwatershed has 9.99 miles of trails. The subwatershed is mostly inaccessible but limited access is provided by forest service roads.

4.1.11.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities may include restoring the natural riparian plant community and eradicating invasive plant species from riparian areas (Lower Columbia Fish Recovery Board 2010).

4.1.12 Crystal Creek – Cispus River (170800040408) – Map Sheet 1

4.1.12.1 Overview

The Crystal Creek – Cispus River (170800040408) HUC is approximately 99.27 total acres within Skamania County and does not include any waterbodies that meet shoreline jurisdiction criteria. The subwatershed extends into Lewis County to the north. This portion of the HUC is located within the Gifford Pinchot National Forest and is located north of Strawberry Mountain.

4.1.12.2 Reaches

This subwatershed has no shoreline reaches in Skamania County.

4.1.12.3 Physical Environment

Information on the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-13. The subwatershed also includes approximately 59.88 acres of landslide hazard zones.

Table 4-13. Surficial Geology and Soil Types - Crystal Creek – Cispus River (170800040408)

Type	Percent
Surficial Geology	
Mass-wasting deposits, mostly landslides	57.2%
Andesite flows	33.7%
Alluvium	9.2%
Soil Types	
Lithic orthents, andepts, cryands, and udands	62%
Typic udivitrands, Cin/Med, FRG	38%

Vegetated cover within the subwatershed is composed of 97.5 percent forested woodland and 2.5 percent nonvascular or sparse vascular rock vegetation.

4.1.12.4 Biological Resources

The PHS priority habitat types within the subwatershed include habitat for elk. The identified PHS species within the subwatershed is northern spotted owl.

4.1.12.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

4.1.12.6 Public Access

The subwatershed does not have any roadway or trail access.

4.1.12.7 Restoration Opportunities

Restoration opportunities are limited with the Skamania County subwatershed because there are no jurisdictional waterbodies and its relatively small size. Potential opportunities could include the protection of the existing undisturbed habitat.

4.1.13 Goat Creek – Cowlitz River (170800050201) – Map Sheet 1a

4.1.13.1 Overview

The Goat Creek – Cowlitz River (170800050201) HUC is approximately 181.1 total acres within Skamania County and does not include any waterbodies that meet shoreline jurisdiction criteria. The subwatershed extends into Lewis County to the north. This portion of the HUC is located within the Gifford Pinchot National Forest and is located north of Goat Mountain.

4.1.13.2 Reaches

This subwatershed has no waterbodies that meet shoreline criteria in Skamania County.

4.1.13.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-14.

Table 4-14. Surficial Geology and Soil Types - Goat Creek – Cowlitz River (170800050201)

Type	Percent
Surficial Geology	
Argillic alteration	40.8%
Quartz monzonite	36.9%
Quartz diorite	22.4%

Type	Percent
Soil Types	
Cattcreek very cindery loamy sand, cold, 30 to 65 % slopes	47.5%
Tradedollar sandy loam, 0 to 30 % slopes	36.7%
Rock outcrop-Cattcreek complex, cold, 65 to 90 % slopes	15.4%
Typic udivitrands, Cind/Med, FRG; Lithic orthents, andepts, cryands, and udands	Less than 1% each

Vegetated cover within the subwatershed is entirely composed of forested woodland.

4.1.13.4 Biological Resources

The PHS priority habitat types within the subwatershed include habitat for elk. The PHS species within the subwatershed include northern spotted owl.

4.1.13.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

4.1.13.6 Public Access

The subwatershed has 0.24 miles of trails. The subwatershed does not have any roadway access.

4.1.13.7 Restoration Opportunities

Restoration opportunities are limited with the Skamania County subwatershed because there are no jurisdictional waterbodies and its relatively small size. Potential opportunities could include the protection of the existing undisturbed habitat.

4.1.14 Headwaters Green River (170800050401) – Map Sheets 1 and 1a

4.1.14.1 Overview

The Headwaters Green River (170800050401) HUC is approximately 14,093.1 total acres, and includes 609.95 acres of shoreline jurisdictional area and 8.07 miles of streams and 105.92 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3861/-122.1855. The subwatershed is located in the northwest quadrant of Skamania County and extends into Lewis County to the north. The reach is located in the Gifford Pinchot National Forest and includes the headwaters of Green River and five jurisdictional lakes.

4.1.14.2 Reaches

Green River Reach #1: From the confluence of non-SMA Grizzly Creek to just upstream of Green River Horse Camp. Its downstream location is 46.3479/-122.0817,

and its upstream location is 46.3324/-122.0744. This reach is not a shoreline of statewide significance.

Green River Reach #2: From Green River Horse Camp to just downstream of the confluence of Falls Creek. Its downstream location is 46.3861/-122.1855, and its upstream location is 46.3484/-122.0821. This reach is not a shoreline of statewide significance.

Deadmans Lake: Located on the northwest flanks of Goat Mountain. The center of this waterbody is at 46.3769/-122.1315. This reach is not a shoreline of statewide significance.

Panhandle Lake: Located northeast of Mount Whittier, this waterbody drains north to Green River via a non-jurisdictional unnamed tributary. The center of this waterbody is at 46.334/-122.1214. This reach is not a shoreline of statewide significance.

Shovel Lake: Located north of Mount Whittier, this waterbody drains to Panhandle Lake to the east via a non-jurisdictional unnamed tributary. The center of this waterbody is at 46.3333/-122.1317. This reach is not a shoreline of statewide significance.

Unnamed Waterbody: This lake with associated wetlands is located southeast of Green River Horse Camp, north of Green River at the break between Reach #1 and 2. The center of this waterbody is at 46.3475/-122.0794. This reach is not a shoreline of statewide significance.

Venus Lake: This waterbody is located northwest of Mount Whittier and drains northeast to the non-jurisdictional Lower Venus Lake before reaching Green River via a non-jurisdictional unnamed tributary. The center of this waterbody is at 46.3416/-122.1532. This reach is not a shoreline of statewide significance.

4.1.14.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-15. The subwatershed also includes approximately 176 acres of landslide hazard zones.

Table 4-15. Surficial Geology and Soil Types - Headwaters - Green River (170800050401)

Type	Percent
Surficial Geology	
Quartz diorite	68.8%
Alluvium	15.1%
Basalt flows	3.6%
Quartz monzonite	3.4%
Andesite flows	3.4%
Dacite flows	2.1%

Type	Percent
Alpine glacial till, pre-Fraser	1.1%
Pebble breccia; Alpine glacial drift; volcanoclastic deposits or rocks; Mass-wasting deposits, mostly landslides; glacial drift; and water	Less than 1% each
Soil Types	
Rock outcrop-Cattcreek, overblown, cold complex, 65 to 90 % slopes	8.3%
Minniepeak loamy sand, overblown, 5 to 30 % slopes	6.5%
Tradedollar sandy loam, 30 to 65 % slopes	6.0%
Colter cindery sandy loam, 65 to 90 % slopes	5.7%
Rock outcrop-Cattcreek complex, cold, 65 to 90 % slopes	5.6%
Colter loamy sand, overblown, cold, 65 to 90 % slopes	5.4%
Colter loamy sand, overblown, cold, 30 to 65 % slopes	4.8%
Sinnice extremely cindery loamy sand, overblown, 65 to 90 % slopes	4.5%
Colter, overblown, cold-Rock outcrop complex, 30 to 65 % slopes	3.6%
Cattcreek very cindery loamy sand, cold, 65 to 90 % slopes	3.5%
Elkprairie loamy sand, 5 to 30 % slopes	3.1%
Colter loamy sand, overblown, 65 to 90 % slopes	3.0%
Tradedollar sandy loam, warm, 65 to 90 % slopes	2.9%
Colter cindery sandy loam, cold, 65 to 90 % slopes	2.5%
Hatchet, cold-Rock outcrop complex, 65 to 90 % slopes	2.5%
Sinnice extremely cindery loamy sand, overblown, 30 to 65 % slopes	2.3%
Tradedollar sandy loam, warm, 30 to 65 % slopes	2.2%
Minniepeak cindery sandy loam, 5 to 30 % slopes	2.1%
Sinnice, overblown, cold-Rock outcrop complex, 65 to 90 % slopes	2.0%
Colter loamy sand, overblown, 30 to 65 % slopes	2.0%
Tradedollar sandy loam, warm, 0 to 30 % slopes	1.9%
Benham very cindery sandy loam, 0 to 30 % slopes	1.7%
Tradedollar sandy loam, 0 to 30 % slopes	1.6%
Swift cindery sandy loam, 30 to 65 % slopes	1.6%
TYPIC UDIVITRANDS, CIND/MED, FRG	1.5%
Colter, cold-Rock outcrop complex, 30 to 65 % slopes	1.5%
Cattcreek very cindery loamy sand, cold, 30 to 65 % slopes	1.5%
Colter cindery sandy loam, 30 to 65 % slopes	1.2%
Water	1.1%
Sinnice extremely cindery loamy sand, overblown, cold, 5 to 30 % slopes; Rock outcrop-Rubbleland complex; Colter extremely cindery loamy sand, overblown, cold, 30 to 65 % slopes; Tradedollar sandy loam, 65 to 90 % slopes; Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90 % slopes; Minniepeak extremely cindery loamy sand, overblown, 30 to 65 % slopes; Sinnice loamy sand, cold-rock outcrop complex, 65 to 90 % slopes; Lithic orthents, andepts, cryands, and udands; Colter cindery sandy loam, cold, 0 to 30 %	Less than 1% each

Type	Percent
slopes; Hatchet, overblown, cold-rock outcrop complex, 65 to 90 % slopes; Zynbar gravelly silt loam, till substratum, 8 to 30 % slopes; Sinnice extremely cindery loamy sand, cold, 5 to 30 % slopes; Colter cindery sandy loam, 0 to 30 % slopes; Hatchet-rock outcrop complex, 65 to 90 % slopes; Hoffstadt very gravelly sandy loam, 30 to 65 % slopes; Colter loamy sand, overblown, cold 0 to 30 % slopes; and Sinnice extremely cindery loamy sand, overblown, cold, 30 to 65 % slopes	

Vegetated cover within the subwatershed is composed of 45.9 percent forested woodland, 51.3 percent recently disturbed or modified land, 1.4 percent shrubland and/or grassland, and less than one percent agriculture, developed other human use, nonvascular or sparse vascular rock vegetation, and open water.

4.1.14.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, lake, "other" type of wetland, riverine wetland, and habitat for elk. The PHS species within the subwatershed include the northern spotted owl. The monitored non-PHS species within the subwatershed include the Cascades frog.

The subwatershed includes approximately 0.14 stream miles of Toutle cutthroat trout, Green (Toutle) winter steelhead, Green River (Toutle) fall Chinook, and mainstem/North Fork Toutle winter steelhead. Spawning occurs from March through May for winter steelhead; January through June for cutthroat trout; and late September to early-November for fall Chinook (Lower Columbia Fish Recovery Board 2010).

A total of 202 acres of NWI wetlands were identified within the subwatershed. These wetlands include 52.7 percent freshwater pond, 24.8 percent lake, 13.4 percent riverine wetland, 6.3 percent freshwater forested/shrub wetland, 1.6 percent other, and 1.3 percent freshwater emergent wetland.

4.1.14.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 97 percent government services; 3 percent mining and extraction establishments; and less than one percent agriculture, forestry, fishing, and hunting uses. Approximately 3 percent of the subwatershed is privately owned by Weyerhaeuser Company as fee simple in-holder parcels with only mining and extraction establishments land uses. Approximately 97 percent of the subwatershed is publicly owned. The subwatershed is entirely unzoned.

The subwatershed has approximately 33.78 miles of roads with a road density of 1.53 miles per square mile. The subwatershed has approximately 5,478,356 square feet of impervious road surfaces, and no additional impervious area for structures.

Known archaeological, cultural, or historical resources within the subwatershed include 35 archaeological sites.

The subwatershed has one wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with copper within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Green River Reach #1
This reach has 1.25 total stream miles under shoreline jurisdiction and 58.67 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.14 miles of roads within the reach's shoreline jurisdiction. It has approximately 22,654 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Green River Reach #2
This reach has 6.82 total stream miles under shoreline jurisdiction and 327.22 acres of shoreline jurisdictional area. The existing land uses within this reach are 81.4 percent government services and 18.6 percent mining and extraction establishments. Approximately 18.6 percent of the reach is privately owned and 81.4 percent is publicly owned. In terms of zoning, the reach is entirely unzoned.

There are approximately 0.65 miles of roads within the reach's shoreline jurisdiction. It has approximately 102,496 square feet of impervious road surfaces, and no additional impervious area for structures. There is a State 303d listing for copper within this reach. No additional altered conditions are known to be present within this reach.

Deadmans Lake
This reach has a total of 30.41 acres and 55.08 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Panhandle Lake
This reach has a total of 15.45 acres and 43.91 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Shovel Lake
This reach has a total of 19.35 acres and 38.91 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody
This reach has a total of 18.82 acres and 40.6 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

The reach has approximately 0.32 miles of roads with a road density of 4.99 miles per square mile. It has approximately 49,984 square feet of impervious road surfaces and no impervious structural surfaces. There is a State 303d listing for copper within this reach. No additional altered conditions are known to be present within this reach.

Venus Lake
This reach has a total of 21.89 acres and 45.55 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.1.14.6 Public Access
The subwatershed has 20.80 miles of trails and includes the Green River Horse Camp, which is operated by the USFS. The subwatershed is fairly inaccessible from local roads or state highways but some access is provided from forest service roads.

4.1.14.7 Restoration Opportunities
While the Green River was spared the severe impacts from the 1980 Mount St. Helens eruption, the reaches are most impacted by forestry practices. Ecological conditions within this subwatershed have been negatively affected according to the 303(d) listing associated with copper within the subwatershed (Appendix A Map 12). Restoration efforts may be focused on the restoration and preservation of watershed process conditions. Also, the upper Green River contains functioning floodplains which should be protected to prevent further degradation (Lower Columbia Fish Recovery Board 2010).

4.1.15 Upper Green River (170800050402) – Map Sheet 1a

4.1.15.1 Overview
The Upper Green River (170800050402) HUC is approximately 7,570.75 total acres, and includes 319.92 acres of shoreline jurisdictional area and 2.89 miles of streams and 92.96 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.3861/-122.2101. This HUC is located in the

northwest corner of Skamania County with portions of the HUC extending into Lewis County to the North and Cowlitz County to the east. The subwatershed is primary located within the Gifford Pinchot National Forest and includes a small portion of the Green River, a tributary, three lakes and associated wetlands.

4.1.15.2 Reaches

Green River Reach #3: This short reach of the Green River flows in the general northeast to southwest direction and continues until the Cowlitz County boundary. Its downstream location is 46.3834/-122.2399, and its upstream location is 46.3860/-122.2306. This reach is not a shoreline of statewide significance.

Miners Creek: This reach flows south to north and continues until the Lewis County boundary. Its downstream location is 46.3861/-122.2101, and its upstream location is 46.3588/-122.2033. This reach is not a shoreline of statewide significance.

Elk Lake: This waterbody eventually drains to Shultz Creek to the east in Cowlitz County. The center of this waterbody is at 46.3352/-122.2359. This reach is not a shoreline of statewide significance.

Hanaford Lake: This waterbody drains to Elk Lake to the north via a non-jurisdictional unnamed tributary. The center of this waterbody is at 46.3289/-122.2334. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #1: This lake with associated wetlands drains to Green River via Tradedollar Creek. The center of this waterbody is at 46.3615/-122.2228. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #2: This associated wetlands is adjacent to Miners Creek and east of Unnamed Waterbody #1. The center of this waterbody is at 46.3572/-122.2036. This reach is not a shoreline of statewide significance.

4.1.15.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-16.

Table 4-16. Surficial Geology and Soil Types - Upper Green River (170800050402)

Type	Percent
Surficial Geology	
Quartz diorite	35.7%
Volcanoclastic deposits or rocks	32.9%
Alpine glacial till, pre-Fraser	15.9%
Basalt flows	10.7%
Alluvium	4.2%
Water and andesite flows	Less than 1% each
Soil Types	
Vanson loamy sand, overblown, 65 to 90 % slopes	11.3%

Type	Percent
Cattcreek very cindery loamy sand, cold, 65 to 90 % slopes	11.1%
Elkprairie loamy sand, 5 to 30 % slopes	10.8%
Vanson loamy sand, overblown, 30 to 65 % slopes	8.3%
Vanson loamy sand, overblown, cold, 30 to 65 % slopes	8.3%
Tradedollar sandy loam, 30 to 65 % slopes	7.2%
Hatchet loamy sand, overblown, cold, 65 to 90 % slopes	5.7%
Rock outcrop-Cattcreek complex, cold, 65 to 90 % slopes	5.5%
Tradedollar sandy loam, warm, 30 to 65 % slopes	3.9%
Swift, overblown-Rock outcrop complex, 65 to 90 % slopes	3.3%
Vanson, overblown-Rock outcrop complex, 65 to 90 % slopes	3.1%
Swift loamy sand, overblown, 2 to 30 % slopes	3.1%
Vanson loamy sand, overblown, cold, 5 to 30 % slopes	2.5%
Tradedollar sandy loam, 0 to 30 % slopes	2.4%
Tradedollar sandy loam, 65 to 90 % slopes	2.3%
Hatchet loamy sand, overblown, 65 to 90 % slopes	1.8%
Cryandepts extremely cindery loamy sand, overblown, 45 to 120 % slopes	1.7%
Cinnamon sandy loam, 2 to 30 % slopes	1.3%
Hatchet, cold-Rock outcrop complex, 30 to 65 % slopes	1.2%
Water	1.0%
Zynbar gravelly silt loam, till substratum, 8 to 30 % slopes; Swift cindery sandy loam, warm, 65 to 90 % slopes; Tradedollar sandy loam, warm, 65 to 90 % slopes; Rock outcrop-Cattcreek, overblow, cold complex, 65 to 90 % slopes; Vitric haplocryands, Cind/Med; Typic udivitrands, Pum, M, FRG; and Lithic orthents, andepts, cryands, and udands	Less than 1% each

Vegetated cover within the subwatershed is composed of 3.2 percent developed other human use, 39.5 percent forested woodland, 56.5 percent recently disturbed or modified land, and less than one percent agriculture, open water, and shrubland and/or grassland.

4.1.15.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater pond, lake, "other" type of wetland, riverine wetland, habitat for elk, and habitat for mule and black-tailed deer. The PHS species within the subwatershed include northern spotted owl and gray wolf.

Approximately 2.08 stream miles of Green (Toutle) winter steelhead, Green River (Toutle) coho, and Mainstem/North Fork Toutle winter steelhead, and 0.57 stream miles of Toutle coastal cutthroat and Green River (Toutle) fall Chinook are found within the subwatershed. Spawning occurs from March through May for winter steelhead; January through June for cutthroat trout; and late September to early-November for fall Chinook (Lower Columbia Fish Recovery Board 2010).

Approximately 192 acres of NWI wetlands are located within this subwatershed. They include approximately 41.8 percent lake, 37.9 percent "other" type of wetland, 12.7 percent freshwater pond, 6.3 percent freshwater emergent wetland, and 1.3 percent riverine wetland.

4.1.15.5 Land Use and Altered Conditions

The existing land uses within the subwatershed is 60.2 percent mining and extraction establishments, and 39.8 percent government services. Approximately 60.2 percent of the subwatershed is privately owned parcels outside of the GPNF, and 39.8 percent is publicly owned. The subwatershed is entirely unzoned.

The subwatershed has approximately 57.24 miles of roads and a road density of 4.84 miles per square mile. The subwatershed has approximately 8,987,326 square feet of impervious road surfaces, and no additional impervious area of structures.

Known archeological, cultural, or historical resources within the subwatershed include two archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Green River Reach #3

This reach has 0.84 total stream miles under shoreline jurisdiction and 40.07 acres of shoreline jurisdictional area. The existing land use within this reach is entirely mining and extraction establishments. All of the reach is privately owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Miners Creek

This reach has 2.06 total stream miles under shoreline jurisdiction and 99.07 acres of shoreline jurisdictional area. The existing land uses within this reach are 69.3 percent government services and 30.7 percent mining and extraction establishments. Approximately 30.7 percent of the reach is privately owned and 69.3 percent is publicly owned. The reach is entirely unzoned. There are approximately 0.48 miles of roads within the reach's shoreline jurisdiction. It has approximately 74,688 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Elk Lake

This reach has a total of 27.22 acres and 51.56 acres of jurisdictional area. The existing land use within this reach is entirely mining and extraction establishments. All of the reach is privately owned and it is entirely unzoned. It has approximately 3,284 square feet of impervious road surfaces and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Hanaford Lake
This reach has a total of 21.63 acres and 44.35 acres of jurisdictional area. The existing land use within this reach is entirely mining and extraction establishments. All of the reach is privately owned and it is entirely unzoned. No additional altered conditions are known to be present within this reach.

The reach has approximately 0.18 miles of roads and a road density of 2.59 miles per square mile. It has approximately 26,983 square feet of impervious road surfaces, and no additional impervious area for structures.

Unnamed Waterbody #1 (Tradedollar Lake)
This reach has a total of 27.35 acres and 51.62 acres of jurisdictional area. The existing land use within this reach is entirely mining and extraction establishments All of the reach is privately owned and it is entirely unzoned.

The reach has approximately 0.49 miles of roads and a road density of 6.04 miles per square mile. It has approximately 76,824 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #2 (Miner's Creek associated wetlands)
This reach has a total of 16.76 acres and 33.25 acres of jurisdictional area. The existing land uses within this reach are 92.1 percent services – government and 7.9 percent mining and extraction establishments. Approximately 7.9 percent of the reach is privately owned and 92.1 percent is publicly owned. The watershed is entirely unzoned.

The reach has approximately 0.03 miles of roads and a road density of 0.61 miles per square mile. It has approximately 4,004 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

4.1.15.6 Public Access
The subwatershed is fairly accessible from forest service roads that are accessed via seasonal roads including FS 2515 Road and Spirit Lake Highway (State Highway 504).

4.1.15.7 Restoration Opportunities
Ecological conditions within this subwatershed are generally in good condition, but the large number of forest roads within this subwatershed impact sediment supply processes, runoff regime, and water quality. Upgrading or removing problem forest roads, reforesting heavily cut areas that have not recovered naturally, and reducing the effective stormwater runoff will improve hillslope processes (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.1.16 Coldwater Creek (170800050501) – Map Sheets 1 and 1a

4.1.16.1 Overview

The Coldwater Creek (170800050501) HUC is approximately 9,155 total acres and includes 727.91 acres of shoreline jurisdictional area, including 4.99 miles of streams and 367.78 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.2894/-122.2201, and its upstream location is 46.2785/-122.1717. This HUC is mostly within Skamania County with a portion extending west into Cowlitz County. The subwatershed is largely within the Gifford Pinchot National Forest located north of Mount St. Helens and on the western flanks of Mount Whittier.

4.1.16.2 Reaches

Coldwater Creek: This reach flows east to west until its confluence with Coldwater Lake. Its downstream location is 46.3179/-122.2083, and its upstream location is 46.3139/-122.1834. This reach is not a shoreline of statewide significance.

South Coldwater Creek: From the confluence of Spirit Lake Outflow Reach #2 to the county boundary to the west. Its downstream location is 46.2874/-122.2413, and its upstream location is 46.2894/-122.2201. This reach is not a shoreline of statewide significance.

Spirit Lake Outflow #2: This reach begins just west of Bear Cove within Spirit Lake and flows until its confluence with South Coldwater Creek. Its downstream location is 46.2894/-122.2201, and its upstream location is 46.2785/-122.1717. This reach is not a shoreline of statewide significance.

Coldwater Lake: This waterbody is divided between Skamania County and Cowlitz County, north of the Johnston Ridge Observatory. Within Skamania County, this lake is located adjacent to the northern portion of Coldwater Creek. The center of this waterbody is at 46.3096/-122.2278. This reach is not a shoreline of statewide significance.

4.1.16.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-17. The subwatershed also includes approximately 379.27 acres of landslide hazard zones.

Table 4-17. Surficial Geology and Soil Types - Coldwater Creek (170800050501)

Type	Percent
Surficial Geology	
Quartz diorite	32.5%
Volcanoclastic deposits or rocks	26.4%
Basalt flows	24.9%
Alluvium	7.0%
Alpine glacial till, pre-Fraser	3.4%

Type	Percent
Pyroclastic flows	2.7%
Alpine glacial drift, Fraser-age	1.9%
mass-wasting deposits, mostly landslides; Quartz monzonite; and Andesite flows	Less than 1% each
Soil Types	
Tradedollar loamy sand, overblown, 65 to 90 % slopes	14.8%
Rock outcrop-Cattcreek, overblown, cold complex, 65 to 90 % slopes	12.8%
Elkprairie loamy sand, 5 to 30 % slopes	11.7%
Hatchet loamy sand, overblown, 65 to 90 % slopes	8.5%
Vanson loamy sand, overblown, 65 to 90 % slopes	7.5%
Vanson loamy sand, overblown, 30 to 65 % slopes	6.7%
Tradedollar loamy sand, overblown, warm, 30 to 65 % slopes	5.7%
Vanson loamy sand, overblown, cold, 30 to 65 % slopes	5.5%
Tradedollar loamy sand, overblown, 30 to 65 % slopes	3.5%
Tradedollar loamy sand, overblown, warm, 65 to 90 % slopes	3.0%
Hatchet loamy sand, overblown, cold, 65 to 90 % slopes	2.8%
Cattcreek loamy sand, overblown, cold, 65 to 90 % slopes	1.8%
Water	1.7%
Obscurity very bouldery sand, 0 to 30 % slopes	1.6%
Lonestar loamy sand, overblown, 30 to 65 % slopes	1.6%
Studebaker very gravelly loamy sand, 0 to 20 % slopes	1.6%
Hatchet loamy sand, overblown, cold, 30 to 65 % slopes	1.3%
Swift loamy sand, overblown, 2 to 30 % slopes	1.2%
Polepatch extremely bouldery loamy sand, 0 to 30 % slopes	1.1%
Hatchet, overblown, cold-Rock outcrop complex, 30 to 65 % slopes	1.1%
Cinnamon loamy sand, overblown, 2 to 30 % slopes; Histic cryaquepts loamy sand, overblown, 0 to 5 % slopes; Tradedollar sandy loam, 30 to 65 % slopes; Cattcreek loamy sand, overblown, cold, 30 to 65 % slopes; Rock outcrop-Cattcreek complex, cold, 65 to 90 % slopes; Typic udivitrands, Pum, M, FRG; Tradedollar sandy loam, 0 to 30 % slopes; Tradedollar sandy loam, 65 to 90 % slopes; Cattcreek very cindery loamy sand, cold, 65 to 90 % slopes; Vitric haplocryands, Cind/Med; Typic udivitrands, Cind/Med, FRG; Vitrandic udorthents, S-SK, M, FRG; and Lithic orthents	Less than 1% each

Vegetated cover within the subwatershed is composed of 93.5 percent recently disturbed or modified land, 3.9 percent open water, 1.5 percent forested woodland, and less than one percent agriculture, developed other human use, nonvascular or sparse vascular rock vegetation, and shrubland and/or grassland.

4.1.16.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater pond, lake, "other" type of wetland, riverine wetland, and habitat for elk. There are no PHS species listed within the subwatershed. A total of 464.3 acres of NWI wetlands were

identified within the subwatershed. These wetlands include 83 percent lake, 9.2 percent riverine, 5.5 percent other, and 2.4 percent freshwater pond.

Approximately 192.4 acres of NWI wetlands are located within this subwatershed. They included approximately 82.9 percent lake, 9.2 percent riverine wetland, 5.5 percent "other" type of wetland, and 2.4 percent freshwater pond.

4.1.16.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 98.6 percent government services and 1.4 percent mining and extraction establishments. Approximately 1.4 percent of the subwatershed is privately owned and 98.6 percent is publicly owned. The subwatershed is entirely unzoned.

The subwatershed has approximately 12.93 miles of roads with a road density of 0.90 miles per square mile. The subwatershed has approximately 2,873,464 square feet of impervious road surfaces and no impervious structural surfaces. The subwatershed has two bridges on State Highway 504 over East Creek and South Coldwater Creek. Data from County or other roads is not available.

Known archaeological, cultural, or historical resources within the subwatershed include three archaeological sites.

The subwatershed has one wellhead protection area associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with copper within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Coldwater Creek

This reach has 1.39 total stream miles under shoreline jurisdiction and 70.35 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

South Coldwater Creek

This reach has 1.07 total stream miles under shoreline jurisdiction and 51.49 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.86 miles of roads within the reach. It has approximately 270,859 square feet of impervious road surfaces and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Spirit Lake Outflow #2

This reach has 2.54 total stream miles under shoreline jurisdiction and 122.84 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.62 miles of roads within the reach. It has approximately 199,763 square feet of impervious road surfaces and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Coldwater Lake

This reach has a total of 367.78 acres and 483.24 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.1.16.6 Public Access

The subwatershed has 16.87 miles of trails. Spirit Lake Highway (State Highway 504) provides seasonal access to a portion of the subwatershed as well as a number of forest service roads.

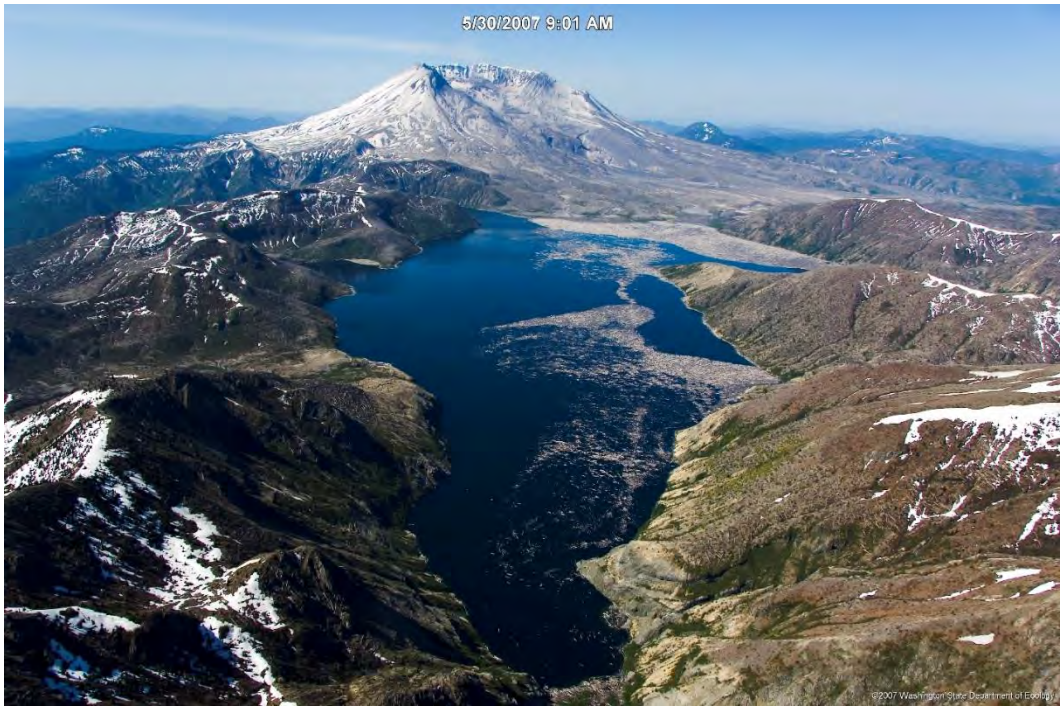
4.1.16.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but he subwatershed was severely impacted by mud and debris flows during the 1980 eruption, followed by intensive road building and timber harvests. These activities impacted the sediment supply, water quality and runoff processes. Restoration opportunities include upgrading or removing problem forest roads and reforesting heavily cut areas that are not recovering naturally (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.1.17 Headwaters North Fork Toutle River (170800050502) – Map Sheets 1 and 1a

4.1.17.1 Overview

The Headwaters North Fork Toutle River (170800050502) HUC is approximately 20,792 total acres and includes 3,351.79 acres of shoreline jurisdictional area from 6.95 miles of streams under shoreline jurisdiction and 2,612.95 acres of shoreline waterbodies. Using the WGS 84, the subwatershed's downstream location is 46.2641/-122.2414. This HUC is mostly within Skamania County with a portion extending west into Cowlitz County. The subwatershed is largely within the Gifford Pinchot National Forest located on the northern flanks of Mount St. Helens. This subwatershed is the main impact of the Mount St. Helens eruption in 1980.



Spirit Lake and Mount St. Helens - 2007 (Washington State Department of Ecology 2015c).

4.1.17.2 Reaches

Forsyth Glacier: This stream reach flows south to north until its confluence at Spirit Lake. Its downstream location is 46.2532/-122.1506, and its upstream location is 46.2451/-122.1613. This reach is not a shoreline of statewide significance.

Sasquatch Steps: This stream reach begins just north of Johnston Ridge Observation point and continues until its confluence with the North Fork Toutle River. Its downstream location is 46.2624/-122.2155 and its upstream location is 46.2350/-122.1840. This reach is not a shoreline of statewide significance.

Spirit Lake Outflow Reach #1: This reach begins as an outflow on the west side of Spirit Lake within Bear Cove and flows west. Its downstream location is 46.2785/-122.1717 and its upstream location is 46.2769/-122.1623. This reach is not a shoreline of statewide significance.

Studebaker Creek: This reach flows south to northwest until the County boundary to the west. Its downstream location is 46.2610/-122.2413 and its upstream location is 46.2465/-122.2339. This reach is not a shoreline of statewide significance.

Toutle River, North Fork: From the confluence of Sasquatch Steps to the County boundary to the west. Its downstream location is 46.2641/-122.2414 and its upstream location is 46.2624/-1252.2155. This reach is not a shoreline of statewide significance.

St. Helens Lake: This waterbody is located northwest of Spirit Lake. The center of this waterbody is at 46.2987/-122.1721. This reach is not a shoreline of statewide significance.

Spirit Lake: This large waterbody is located north-northeast of Mount St. Helens. The center of this waterbody is at 46.2728/-122.1404. This reach is a shoreline of statewide significance.

4.1.17.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-18. The subwatershed also includes approximately 126.57 acres of landslide hazard zones.

Table 4-18. Surficial Geology and Soil Types - Headwaters North Fork Toutle River (170800050502)

Type	Percent
Surficial Geology	
Pyroclastic flows	32.7%
Volcanoclastic deposits or rocks	28.3%
Water	11.0%
Basalt flows	9.9%
Andesite flows	8.2%
Volcanic rocks	3.1%
Quartz monzonite	2.1%
Quartz diorite	1.3%
Granodiorite	1.1%
Alluvium; alpine glacial till; intrusive andesite and dacite; ice; mass-wasting deposits, mostly landslides; diorite; and dacite flows	Less than 1% each
Soil Types	
Studebaker very gravelly loamy sand, 0 to 20 % slopes	28.5%
Panhandle extremely cindery loamy sand, 0 to 20 % slopes	15.3%
Water	11.1%
Rock outcrop-Cattcreek, overblown, cold complex, 65 to 90 % slopes	7.7%
Obscurity very bouldery sand, 0 to 30 % slopes	4.9%
Tradedollar loamy sand, overblown, 30 to 65 %slopes	3.9%
Sinnice, overblown, cold-Rock outcrop complex, 65 to 90 % slopes	3.8%
Elkprairie loamy sand, 5 to 30 % slopes	3.2%
Rock outcrop-Rubbleland complex	3.1%
Sinnice extremely cindery loamy sand, overblown, 65 to 90 % slopes	2.8%
Tradedollar loamy sand, overblown, warm, 30 to 65 %slopes	2.2%
Colter loamy sand, overblown, cold, 65 to 90 % slopes	2.1%
Vanson loamy sand, overblown, 65 to 90 % slopes	1.7%

Type	Percent
Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90 % slopes	1.7%
Colter loamy sand, overblown, 65 to 90 % slopes	1.6%
Lonestar loamy sand, overblown, 65 to 90 % slopes; Sinnice loam sand, overblown, cold-rock outcrop, 65 to 90 %slopes; Lonestar loam sand, overblown, warm, 65 to 90 % slopes; Sinnice extremely cindery loamy sand, overblown, cold, 30 to 65 % slopes; Minniepeak loamy sand, overblown, 5 to 30 %slopes; Tradedollar loamy sand, overblown, 65 to 90 % slopes; Polepatch loamy sand, overblown, 0 to 30 % slopes; Sinnice extremely cindery loamy sand, overblown, 30 to 65 % slopes; Sinnice extremely cindery loamy sand, overblown, cold, 5 to 30 % slopes; Shoestring loamy sand, overblown, 50 to 90 % slopes; Colter, overblown, cold-rock outcrop complex, 65 to 90 % slopes; Vanson, overblown-rock outcrop complex, 65 to 90 % slopes; Vanson loamy sand, overblown, 30 to 65 % slopes; Vitrandic udorthens, S-SK, M, FRG; Typic udivitrands, Cind/Med, FRG; Badlands	Less than 1% each

Vegetated cover within the subwatershed is composed of 54 percent nonvascular or sparse vascular rock vegetation, 41 percent recently disturbed or modified land (most likely due to the eruption of Mt. St. Helens in 1980), 4.3 percent open water, and less than one percent of the following types: developed other human use, forested woodland, and shrubland and/or grassland.

4.1.17.4 Biological Resources

The PHS habitats within the subwatershed include freshwater pond, lake, "other" type of wetland, and riverine wetland. The PHS species within the subwatershed include the western toad. The monitored non-PHS species within the subwatershed include the Cascades frog. Approximately 3.61 stream miles of Toutle coastal cutthroat habitat are found within the subwatershed. A sediment retention structure was built after the Mount St. Helens eruption and is located further downstream of the North Fork Toutle River. The structure inhibits the natural passage of cutthroat upstream and they are being trucked upstream of the structure. Spawning activity occurs from January through June (Washington Department of Fish and Wildlife 2011a).

The eruption of Mount St. Helens in 1980 dramatically transformed habitats in this subwatershed, including forests, meadows, lakes, and streams. The eruption resulted in a lateral blast (e.g., downed tree) area within a 15 mile radius north of the volcano (USFS 2000). The speed of vegetation re-establishment was generally related to the degree of intensity of the blast in a given location, and over the past several years, the blast zone has gradually began to revegetate (USFS 2000). Additionally, Spirit Lake was transformed from a relatively pristine could-water mountain lake to a larger and shallower lake with an extensive microbial community and no-air breathing organisms (USFS 2016a). Currently, this lake has a large amount of debris,

including large woody debris (LWD). According to the U.S. Forest Service, Spirit Lake has gradually returned to conditions that support plant and animal communities; however, it will likely take centuries for plant and animal communities to resemble the pre-eruption communities (USFS 2016a).

A total of 2,653.4 acres of NWI wetlands were identified within the subwatershed. These wetlands include 97.6 percent lake, 1.7 percent riverine wetland, and less than one percent freshwater pond and "other" type of wetland.

4.1.17.5 Land Use and Altered Conditions

The existing land uses within the subwatershed includes 99.4 percent government servicesand less than one percent of construction-related business and mining and extraction establishments uses. All of the reach is publicly owned and it is entirely unzoned. A sediment retention structure was built after the Mount St. Helens eruption and is located further downstream of the North Fork Toutle River.

The subwatershed has approximately 0.58 miles of roads with a road density of 0.02 miles per square mile. The subwatershed has approximately 18,667 square feet of impervious structural surfaces and 106,332 square feet of impervious road surfaces for a total of 124,999 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include 40 archaeological sites and two historic register polygons.

The subwatershed has two wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

Forsyth Glacier

This reach has 0.88 total stream miles under shoreline jurisdiction and 43.17 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach has no road surfaces or impervious area for structures. No additional altered conditions are known to be present within this reach.

Sasquatch Steps

This reach has 2.84 total stream miles under shoreline jurisdiction and 138.61 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach has no road surfaces or impervious area for structures. No additional altered conditions are known to be present within this reach.

Spirit Lake Outflow Reach #1

This reach has 0.46 total stream miles under shoreline jurisdiction and 21.67 acres of shoreline jurisdictional area. The only existing land use within this reach is

government services. All of the reach is publicly owned and it is entirely unzoned. The reach has no road surfaces or impervious area for structures. No additional altered conditions are known to be present within this reach.

Studebaker Creek
This reach has 1.41 total stream miles under shoreline jurisdiction and 84.59 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach has no road surfaces or impervious area for structures. No additional altered conditions are known to be present within this reach.

Toutle River, North Fork
This reach has 1.37 total stream miles under shoreline jurisdiction and 70.84 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach has no road surfaces or impervious area for structures. No additional altered conditions are known to be present within this reach.

St. Helens Lake
This reach has a total of 78.75 acres and 114.64 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. The reach has no road surfaces or impervious area for structures. No additional altered conditions are known to be present within this reach.

Spirit Lake
This reach has a total of 2534.2 acres and 2878.27 acres of jurisdictional area. The existing land use within this reach is 96.2 percent government services; 2.8 percent construction-related business, and 1 percent mining and extraction establishments. All of the reach is publicly owned and it is entirely unzoned. The reach has no road surfaces or impervious area for structures.

4.1.17.6 Public Access
The subwatershed has 27.73 miles of trails but is fairly inaccessible from roads. However, Spirit Lake Highway (State Highway 504) does provide seasonal access to a portion of the subwatershed.

4.1.17.7 Restoration Opportunities
Ecological conditions within this subwatershed are generally in good condition, but the North Fork Toutle River was severely impacted by mud and debris flows during the 1980 eruption, followed by intensive road building and timber harvests. These activities impacted the sediment supply, water quality and runoff processes. Restoration opportunities include upgrading or removing problem forest roads and reforesting heavily cut areas that are not recovering naturally (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.1.18 Upper North Fork Toutle River (170800050503) – Map Sheet 1

4.1.18.1 Overview

The Upper North Fork Toutle River (170800050503) HUC is approximately 425.5 total acres within Skamania County and does not include any waterbodies that meet shoreline jurisdiction criteria. The subwatershed extends into Cowlitz County to the west. The portion of the HUC is located within the Gifford Pinchot National Forest and is located on the northwestern flank of Mount St. Helens.

4.1.18.2 Reaches

This subwatershed has no jurisdictional shoreline reaches in Skamania County.

4.1.18.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-19.

Table 4-19. Surficial Geology and Soil Types - Upper North Fork Toutle River (170800050503)

Type	Percent
Surficial Geology	
Volcanoclastic deposits or rocks	79.8%
Pyroclastic flows	20.2%
Soil Types	
Studebaker very gravelly loamy sand, 0 to 20 % slopes	39.5%
Polepatch loamy sand, overblown, 0 to 30 % slopes	28.1%
Elkprairie loamy sand, 5 to 30 % slopes	24.5%
Polepatch very cobbly loamy sand, 50 to 90 % slopes	7.2%
Vitrandic udorthents, S-SK, M, FRG; Badland; and orthents, andepts, cryands, and udands	Less than 1% each

Vegetated cover within the subwatershed is composed of 55.1 percent recently disturbed or modified land, 43.4 percent nonvascular or sparse vascular rock vegetation, 1.3 percent forested woodland, and less than one percent agriculture

4.1.18.4 Biological Resources

There are no PHS priority habitat types or PHS species listed within the subwatershed.

4.1.18.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. Known archaeological, cultural, or historical resources within the subwatershed includes one Register polygon.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

4.1.18.6 Public Access

The subwatershed has 0.70 miles of trails. The subwatershed is mostly inaccessible from state highways or local roads but access is provided to portions of the subwatershed via forest service roads.

4.1.18.7 Restoration Opportunities

Although there are no reaches within this subwatershed, restoration opportunities may include proper forest management to protect and restore watershed processes. Upgrading or removing problem forest roads and reforesting heavily cut areas not recovering naturally will help restore the natural habitat as the hillslope runoff and sediment delivery processes have been degraded due to the 1980 Mount St. Helens eruption and subsequent intensive timber harvest and road building (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.1.19 Headwaters South Fork Toutle River (170800050601) – Map Sheet 1

4.1.19.1 Overview

The Headwaters South Fork Toutle River (170800050601) HUC is approximately 2,634.23 total acres within Skamania County and does not include any waterbodies that meet shoreline jurisdiction criteria. The subwatershed extends into Cowlitz County to the west. The portion of the HUC is located within the Gifford Pinchot National Forest and is located on the western flank of Mount St. Helens.

4.1.19.2 Reaches

This subwatershed does not contain any waterbodies that meet shoreline jurisdiction in Skamania County.

4.1.19.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-20.

Table 4-20. Surficial Geology and Soil Types - Headwaters South Fork Toutle River (170800050601)

Type	Percent
Surficial Geology	
Volcanoclastic deposits or rocks	64.4%
Andesite flows	15.6%
Lahars	11.2%
Ice	4.4%
Pyroclastic flows	2.4%
Intrusive andesite and dacite	1.1%
Glacial drift, undivided	Less than 1% each
Soil Types	
Rock outcrop-Rubbleland complex	40.7%
Obscurity very bouldery sand, 0 to 30 % slopes	14.0%
Polepatch extremely bouldery loamy sand, cold, 0 to 30 % slopes	10.5%

Type	Percent
Badland	9.2%
Studebaker very gravelly loamy sand, 0 to 20 % slopes	8.1%
Lithic Umbric Vitrandepts, 0 to 15 % slopes	4.8%
Polepatch extremely bouldery loamy sand, 0 to 30 % slopes	4.2%
Shoestring fine sandy loam, 50 to 90 % slopes	2.9%
Polepatch loamy sand, overblown, 0 to 30 % slopes	2.75
Polepatch very cobbly loamy sand, 50 to 90 % slopes	2.1%
Lonestar cindery sandy loam, 5 to 30 % slopes; Lonestar cindery sandy loam, 30 to 65 % slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 52.2 percent nonvascular or sparse vascular rock vegetation, 41.2 percent forested woodland, 6.6 percent recently disturbed or modified land, and less than one percent high montane vegetation and shrubland and/or grassland.

4.1.19.4 Biological Resources

The PHS species within the subwatershed include the northern spotted owl. No PHS priority habitat types or monitored non-PHS species are listed within the subwatershed.

4.1.19.5 Land Use and Altered Conditions

The only existing land use within this reach is 100 percent government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach.

Known archaeological, cultural, or historical resources within the subwatershed include one register polygon.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

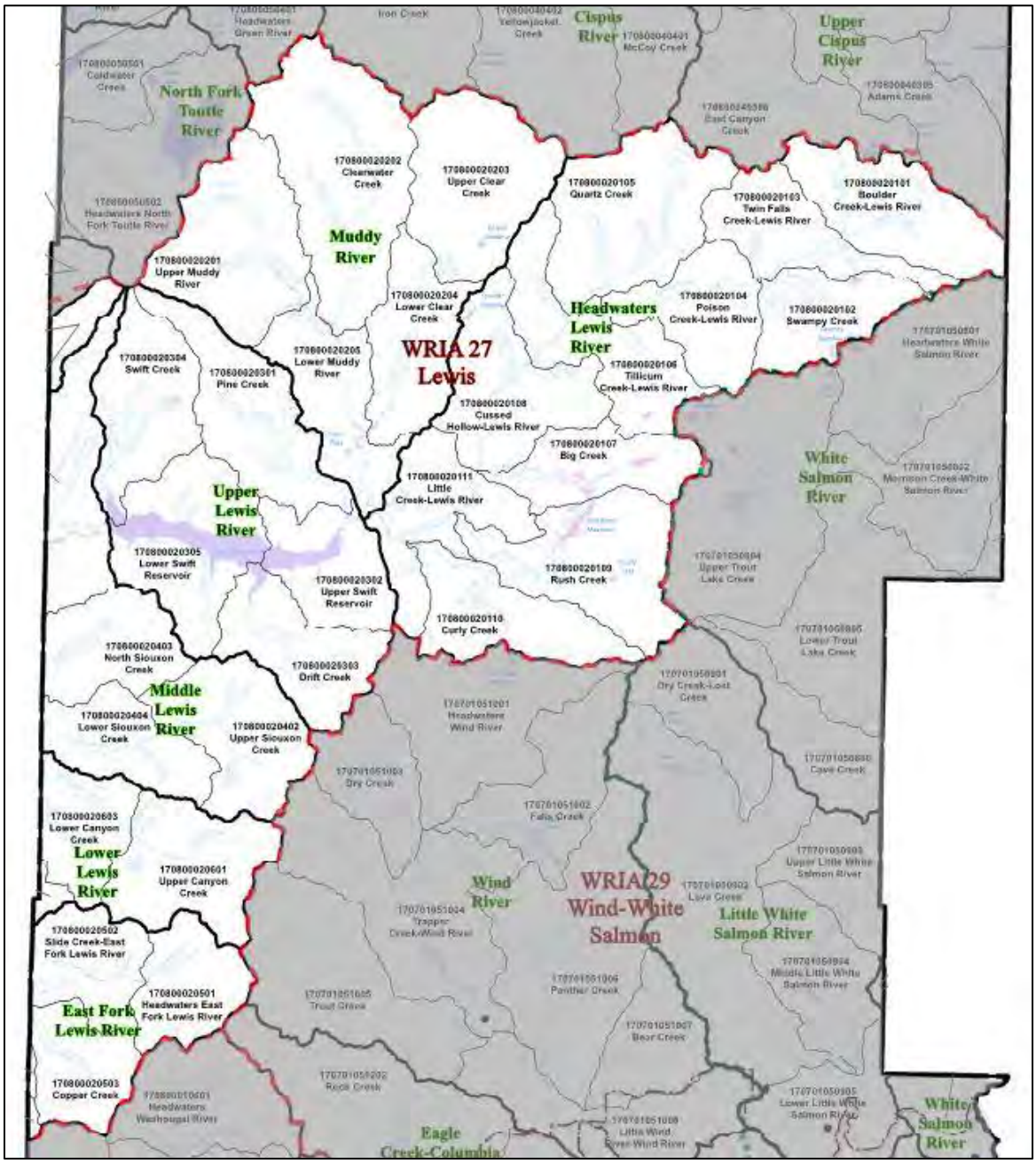
4.1.19.6 Public Access

The subwatershed has 3.84 miles of trails. The subwatershed is inaccessible from state highways or local roads but access is provided to portions of the subwatershed via forest service roads.

4.1.19.7 Restoration Opportunities

Although there are no reaches within the Skamania County subwatershed, restoration opportunities may include proper forest management to protect and restore watershed processes. Upgrading or removing problem forest roads and reforesting heavily cut areas not recovering naturally will help restore the natural habitat (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2 WRIA No. 27



WRIA 27 – Lewis has a drainage basin of approximately 1,308 square miles and includes the Lewis River and its tributaries, which generally flows west from Mount Adams, through Skamania and Clark counties, toward its confluence with the Columbia River south of Woodland, WA. Approximately 638 square miles of WRIA 27 are located within the west and north-central parts of the County. The streams and rivers of WRIA 27 generally flow southwest through the Gifford Pinchot National Forest and pass south of Mount St. Helens before entering Clark County to the west and Cowlitz County to the north. The major surface waters of WRIA 27 that

are located within Skamania County include the headwaters of the Lewis River, Muddy River, Upper Lewis River, Middle Lewis River, Lower Lewis River, and East Fork Lewis River. Some of the significant lakes and reservoirs located in WRIA 27 include Swift Reservoir and Placid Lake. Swift Reservoir is a 4,600-acre lake created upstream of Swift Dam, which was built in 1958 for hydroelectric power generation and provides a variety of fishing, camping, swimming, and other recreational opportunities.

WRIA 27 includes approximately 18,453.65 acres of shoreline jurisdictional area and 229.82 miles of streams under shoreline jurisdiction. This WRIA is mostly located on U.S. Forest land. Approximately 63 percent of the WRIA is publicly owned and 37 percent is privately owned. The existing land use within the WRIA includes approximately 90 percent government services (e.g., education, public administration, health care, government-owned national forest land), 8 percent mining and extraction establishments, and less than one percent of each of the following: residence or accommodation functions, transportation, communication, construction-related business, agriculture, forestry, fishing and hunting, and undefined land uses. It has approximately 5,356.78 acres of landslide hazard zones and 4,801.48 acres of FEMA 100-year floodplain. Human-made impassable barriers and a loss of access to headwater production areas within the WRIA has severely reduced the distribution of some salmon populations (Lower Columbia Fish Recovery Board 2010).

Mount Saint Helens from McClellan Overlook (Skamania County 2015a)

4.2.1 Boulder Creek – Lewis River (170800020101) – Map Sheet 2

4.2.1.1 Overview

The Boulder Creek – Lewis River (170800020101) HUC is approximately 14,998 total acres within Skamania County, including 472.5 acres of shoreline jurisdictional area and 9.49 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.2233/-121.6481. The subwatershed is located in the Gifford Pinchot National Forest on the northwest flanks of Mount Adams. The HUC is largely within Skamania County and a small portion extends east into Yakima County.

4.2.1.2 Reaches

Big Spring Creek: Flows west from the confluence of Riley Creek to its confluence with the Lewis River. Its downstream location is 46.2233/-121.6481, and its upstream location is 46.2253/-121.6391. This reach is not a shoreline of statewide significance.

Boulder Creek: This reach flows from north to south until its confluence with the Lewis River. Its downstream location is 46.2354/-121.6426, and its upstream location is 46.2523/-121.6498. This reach is not a shoreline of statewide significance.

Lewis River Reach #1: This reach is the jurisdictional headwaters of the Lewis River and flows first to the northwest then to the southwestand continues until the confluence of Boulder Creek. Its downstream location is 46.2354/-121.6426, and its upstream location is 46.2481/-121.5855. This reach is not a shoreline of statewide significance.

Lewis River Reach #2: From the confluence of Boulder Creek to the confluence of Big Spring Creek at the subwatershed boundary. Its downstream location is 46.2233/-121.6481, and its upstream location is 46.2354/-121.6426. This reach is not a shoreline of statewide significance.

Riley Creek: This reach begins upstream of the confluence of the non-jurisdictional Mutton Creek to the north, includes associated wetlands, and flows west until its confluence with Big Spring Creek. Its downstream location is 46.2253/-121.6391, and its upstream location is 46.2244/-121.5924. This reach is not a shoreline of statewide significance.

4.2.1.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in

Table 4-21. The subwatershed also includes approximately 126.29 acres of landslide hazard zones.

Table 4-21. Surficial Geology and Soil Types - Boulder Creek – Lewis River (170800020101)

Type	Percent
Surficial Geology	
Andesite flows	85.0%
Alpine glacial drift, Fraser-age	6.3%
Ice	2.9%
Alluvium	1.9%
Basalt flows	1.8%
Volcanoclastic deposits or rocks	1.4%
Mass-wasting deposits, mostly landslides	Less than 1% each
Soil Types	
Typic vitricryands, Pum	41.1%
Typic udivitrands, Pum, M, FRG	15.7%
Vitric haplocryands, Cind/Med	13.6%
Lithic orthents, andepts, cryands, udands	13.6%
Typic vitricryands, Pum, M	6.0%
Orthents, andepts, cryands	4.3%
Unclassified	2.4%
Aquolls, fibrists, aquods	1.7%
Typic udivitrands, Pum/S-SK, FRG; Typic vitricryands, Ashy/Med-SK; Aquic vitricryands, Ashy/Med-SK; and Typic udivitrands, Cin/Med, FRG	Less than 1% each

Vegetated cover within the subwatershed comprises 79.7 percent forested woodland, 8.4 percent nonvascular or sparse vascular rock vegetation, 7.5 percent recently disturbed or modified land, and less than one percent developed other human use and shrubland and/or grassland.

4.2.1.4 Biological Resources

The PHS habitat within the subwatershed includes freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, and riverine wetland. The PHS species within the subwatershed include northern spotted owl, northern goshawk, and wolverine. The monitored non-PHS species within the subwatershed include Cascades frog and tailed frog.

A total of 227 acres of NWI wetlands were identified within the subwatershed. These wetlands include 53.8 percent freshwater emergent wetland, 39.1 percent freshwater forested/shrub wetland, 7 percent freshwater pond, and less than one percent riverine wetland.

4.2.1.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 20.23 miles of roads with a road density of 0.86 miles per square mile. It has approximately 3,646,104 square feet of impervious road surfaces, and no additional impervious surfaces from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 23 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Big Spring Creek
This reach has 0.52 total stream miles under shoreline jurisdiction and 24.21 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Boulder Creek
This reach has 1.47 total stream miles under shoreline jurisdiction and 70.81 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.13 miles of roads within the reach's shoreline jurisdiction resulting in approximately 23,677 square feet of impervious road surfaces. There are no additional impervious surfaces from structures. No additional altered conditions are known to be present within this reach.

Lewis River Reach #1
This reach has 3.77 total stream miles under shoreline jurisdiction and 186.38 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.21 miles of roads within the reach's shoreline jurisdiction. It has approximately 45,753 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Lewis River Reach #2
This reach has 0.96 total stream miles under shoreline jurisdiction and 45.86 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.05 miles of roads within the reach's shoreline jurisdiction, resulting in approximately 10,301 square feet of impervious surfaces. There are no

additional impervious surfaces from structures. No additional altered conditions are known to be present within this reach.

Riley Creek
This reach has 2.77 total stream miles under shoreline jurisdiction and 145.24 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.22 miles of roads within the reach's shoreline jurisdiction. It has approximately 46,986 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

4.2.1.6 Public Access

The subwatershed has 16.98 miles of trails and is accessible from forest service roads. The majority of which are accessed via the major forest service road NF-23.

4.2.1.7 Restoration Opportunities

The headwaters of the Lewis River contain relatively pristine forests that support functioning watershed process conditions. Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities may include upgrading or removing any problem forest roads to minimize impacts of sediment supply on water quality (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.2 Swampy Creek (170800020102) – Map Sheet 2

4.2.2.1 Overview

The Swampy Creek (170800020102) HUC is approximately 9,957 total acres with 665.94 acres of shoreline jurisdictional area, including 4.81 miles of streams and 43.27 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.2011/-121.7085. The subwatershed is located in the Gifford Pinchot National Forest, west of Mount Adams. The HUC is located within the northeast quadrant of Skamania County.

4.2.2.2 Reaches

Pass Creek: This reach flows south to north until its confluence with Swampy Creek. Its downstream location is 46.1969/-121.7029, and its upstream location is 46.1779/-121.7033. This reach is not a shoreline of statewide significance.

Swampy Creek Reach #1: This reach begins just downstream of forest service road NF-150 and continues until the confluence of Pass Creek. Its downstream location is 46.1969/-121.7029, and its upstream location is 46.1872/-121.6599. This reach is not a shoreline of statewide significance.

Swampy Creek Reach #2: From the confluence of Pass Creek to its confluence with the Lewis River. Its downstream location is 46.2011/-121.7085, and its upstream location is 46.1969/-121.7029. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #1: This lake with associated wetlands is located east of forest service road NF-23 and just east of the headwaters of the non-jurisdictional North Fork Swampy Creek. The center of this waterbody is at 46.2011/-121.6370. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #2: This lake with associated wetlands is located just west of NF-061, west of Swampy Meadows. The center of this waterbody is at 46.1608/-121.6536. This reach is not a shoreline of statewide significance.

4.2.2.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-22.

Table 4-22. Surficial Geology and Soil Types - Swampy Creek (170800020102)

Type	Percent
Surficial Geology	
Andesite flows	61.6%
Continental sedimentary deposits or rocks, conglomerate	14.3%
Mass-wasting deposits, mostly landslides	13.3%
Alpine glacial drift, Fraser-age	9.7%
Intrusive rocks, undivided; tuffs and tuff breccias; basalt flows; and basaltic andesite flows	Less than 1% each
Soil Types	
Typic vitricryands, Ashy/Med-SK	31.5%
Typic udivitrands, Pum, M, FRG	21.8%
Typic vitricryands, Pum, A	19.6%
Aquic vitricryands, Ashy/Med-SK	11.6%
Typic vitricryands, Pum	7.7%
Aquolls, fibrists, aquods	3.9%
Vitric haplocryands, Cind/Med	2.5%
Lithic orthents, andepts, cryands, udands; Andic cryumbrepts, Med/Lo-SK, M; and Typic udivitrands, Pum/S-SK, FRG	Less than 1% each

The subwatershed also includes approximately 1,320.59 acres of landslide hazard zones near the North Swampy Creek – Swampy Creek confluence and the area south and east of Pass Creek.

Vegetated cover within the subwatershed is composed of 73.2 percent forested woodland, 22.2 percent recently disturbed or modified land, 2.5 percent shrubland and/or grassland, and 2.1 percent developed/other human use.

4.2.2.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, and habitat for elk.

The PHS species within the subwatershed include northern spotted owl and western toad. The monitored non-PHS species within the subwatershed includes the Cascades frog.

A total of 457.9 acres of NWI wetlands were identified within the subwatershed. These wetlands include 76.9 percent freshwater forested/shrub wetland, 20.4 percent freshwater emergent wetland, and 2.7 percent freshwater pond.

4.2.2.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. The entire subwatershed is publicly owned and it is entirely unzoned.

The subwatershed has approximately 35.76 miles of roads with a road density of 2.3 miles per square mile. It has approximately 5,774,443 square feet of impervious road surfaces, and no additional impervious area for structures.

Known archaeological, cultural, or historical resources within the subwatershed include 57 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Pass Creek

This reach has 1.61 total stream miles under shoreline jurisdiction and 77.60 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.08 miles of roads within the reach's shoreline jurisdiction resulting in approximately 12,980 square feet of impervious surfaces. There are no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Swampy Creek Reach #1

This reach has 2.77 total stream miles under shoreline jurisdiction and 134.33 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.39 miles of roads within the reach's shoreline jurisdiction. It has approximately 61,763 square feet of impervious road surfaces, and no

additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Swampy Creek Reach #2
This reach has 0.42 total stream miles under shoreline jurisdiction and 16.51 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #1
This reach has a total of 22.28 acres and 79.85 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #2
This reach has a total of 21 acres and 56.93 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.2.2.6 Public Access
The subwatershed has 8.07 miles of trails. The subwatershed is fairly accessible from forest service roads, the majority of which are accessed via the major forest service road NF-23.

4.2.2.7 Restoration Opportunities
The upper Lewis River contains forests that support functioning watershed process conditions and have mature riparian areas. Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities may include upgrading or removing any problem forest roads to minimize impacts of sediment supply to water quality (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.3 Twin Falls Creek – Lewis River (170800020103) – Map Sheet 2

4.2.3.1 Overview
The Twin Falls Creek – Lewis River (170800020103) HUC is approximately 10,935 total acres, including 357 acres of shoreline jurisdictional area and 7.54 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.2003/-121.7120, and its upstream location is 46.2233/-121.6481. The subwatershed is located in the Gifford Pinchot National Forest, west of

Mount Adams. The HUC is located within the northeast quadrant of Skamania County.

4.2.3.2 Reaches

Lewis River Reach #3: From the confluence of Big Spring Creek to the confluence of Twin Falls Creek. Its downstream location is 46.2149/-121.6680, and its upstream location is 46.2233/-121.6481. This reach is not a shoreline of statewide significance.

Lewis River Reach #4: From the confluence of Twin Falls Creek to the confluence of Swampy Creek. Its downstream location is 46.2011/-121.7085, and its upstream location is 46.2149/-121.6680. This reach is not a shoreline of statewide significance.

Lewis River Reach #5: From the confluence of Swampy Creek to the confluence of Pin Creek. Its downstream location is 46.2003/-121.7120, and its upstream location is 46.2011/-121.7085. This reach is not a shoreline of statewide significance.

Pin Creek: This reach begins just upstream of the confluence with non-jurisdictional Deer Creek and flows south until its confluence with the Lewis River. Its downstream location is 46.2003/-121.7120, and its upstream location is 46.2250/-121.7092. This reach is not a shoreline of statewide significance.

Twin Falls Creek: This reach flows east to west until its confluence with the Lewis River. Its downstream location is 46.2149/-121.6680, and its upstream location is 46.2144/-121.6462. This reach is not a shoreline of statewide significance.

4.2.3.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-23.

Table 4-23. Surficial Geology and Soil Types - Twin Falls Creek – Lewis River (170800020103)

Type	Percent
Surficial Geology	
Andesite flows	95.9%
Alpine glacial drift, Fraser-age	1.6%
Mass-wasting deposits, mostly landslides	1.5%
Alluvium and basalt flows	Less than 1% each
Soil Types	
Vitric haplocryands, Cind/Med	33.7
Typic udivitrands, Pum, M, FRG	28.2
Typic vitricryands, Pum	14.4
Typic vitricryands, Pum, M	6.0
Lithic orthents, andepts, cryands, udands	5.8
Typic udivitrands, Pum /S-SK,FRG	4.4
Typic vitricryands, Ashy/Med-SK	4.4
Aquic vitricryands, Ashy/Med- SK	1.5

Type	Percent
Aquolls, fibrists, aquods; Andic cryumbrepts, Med/Lo-SK, M; and Lithic orthents	Less than 1% each

The subwatershed also includes approximately 159.75 acres of landslide hazard zones.

Vegetated cover within the subwatershed is composed of 86.4 percent forested woodland, 11.8 percent recently disturbed or modified land, 1.2 percent developed other human use, and less than one percent nonvascular or sparse vascular rock vegetation, and shrubland and/or grassland.

4.2.3.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, riverine wetland, and habitat for elk. The PHS species within the subwatershed include northern spotted owl and northern goshawk. The monitored non-PHS species within the subwatershed includes the Cascades frog.

A total of 79.5 acres of NWI wetlands were identified within the subwatershed. These wetlands include 42.8 percent freshwater forested/shrub wetland, 37.6 percent freshwater emergent wetland, 17.6 percent freshwater pond, and 2 percent riverine.

4.2.3.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 22 miles of roads with a road density of 1.29 miles per square mile. It has approximately 3,745,129 square feet of impervious road surfaces, and no additional impervious area for structures.

Known archaeological, cultural, or historical resources within the subwatershed include 35 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Lewis River Reach #3

This reach has 1.37 total stream miles under shoreline jurisdiction and 64.81 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.07 miles of roads within the reach's shoreline jurisdiction. It has approximately 11,149 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Lewis River Reach #4
This reach has 2.52 total stream miles under shoreline jurisdiction and 119.50 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.1 miles of roads within the reach's shoreline jurisdiction resulting in approximately 15,498 square feet of impervious surfaces. There are no additional impervious surfaces for structures. No additional altered conditions are known to be present within this reach.

Lewis River Reach #5
This reach has 0.33 total stream miles under shoreline jurisdiction and 14.20 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Pin Creek
This reach has 2.18 total stream miles under shoreline jurisdiction and 102.39 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.08 miles of roads within the reach's shoreline jurisdiction resulting in approximately 16,232 square feet of impervious surfaces. There are no additional impervious surfaces for structures. No additional altered conditions are known to be present within this reach.

Twin Falls Creek
This reach has 1.15 total stream miles under shoreline jurisdiction and 55.67 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.08 miles of roads within the reach's shoreline jurisdiction resulting in approximately 13,281 square feet of impervious surfaces. There are no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

4.2.3.6 Public Access
The subwatershed has 12.10 miles of trails and is fairly accessible from forest service roads including NF-90 that runs parallel to Lewis River.

4.2.3.7 Restoration Opportunities
The upper Lewis River contains forests that support functioning watershed process conditions and have mature riparian areas. Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities may

include upgrading or removing any problem forest roads to minimize impacts of sediment supply to water quality (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.4 Poison Creek – Lewis River (170800020104) – Map Sheet 2

4.2.4.1 Overview

The Poison Creek – Lewis River (170800020104) HUC is approximately 11,375 total acres, including 365.29 acres of shoreline jurisdictional area and 7.56 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.1803/-121.8329, and its upstream location is 46.2003/-121.7120. The subwatershed is located in the Gifford Pinchot National Forest, north of Steamboat Mountain. The HUC is located within the northeast quadrant of Skamania County.

4.2.4.2 Reaches

Lewis River Reach #6: Flows west from the confluence of Pin Creek at the subwatershed's east boundary to the confluence of Tillicum Creek at the subwatershed's west boundary. Its downstream location is 46.1803/-121.8329, and its upstream location is 46.2003/-121.7120. This reach is not a shoreline of statewide significance.

4.2.4.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-24. The subwatershed also includes approximately 1,468 acres of landslide hazard zones.

Table 4-24. Surficial Geology and Soil Types - Poison Creek – Lewis River (170800020104)

Type	Percent
Surficial Geology	
Andesite flows	50.9%
Mass-wasting deposits, mostly landslides	12.9%
Continental sedimentary deposits or rocks, conglomerate	11.9%
Tuffs and tuff breccias	11.8%
Basalt flows	10.5%
Diorite	1.6%
Intrusive rocks, undivided	Less than 1% each
Soil Types	
Vitric haplocryands, Cind/Med	36.4%
Typic udivitrands, Pum, M, FRG	32.5%
Typic vitricryands, Ashy/Med-SK	15.6%
Typic udivitrands, pum/s-sk, FRG	5.6%
Aquic vitricryands, Ashy/Med-SK	2.9%
Lithic orthents, andepts, cryands, udands	2.4%
Typic vitricryands, Pum, M	1.3%
Aquolls, fibrists, aquods	1.2%
Andic cryumbrepts, Med/Lo-SK, M	1.1%

Type	Percent
Typic udivitrands, Cind/Med, FRG; Typic vitrcricryands, Pum; and Andic haplumbrepts, Med/Lo-SK, M, FRG	Less than 1% each

Vegetated cover within the subwatershed is composed of 76.7 percent forested woodland, 21.4 percent recently disturbed or modified land, and one percent or less developed other human use, and shrubland and/or grassland.

4.2.4.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, riverine wetland, and habitat for elk. The PHS species within the subwatershed include northern spotted owl, northern goshawk and Larch Mountain salamander. The monitored non-PHS species within the subwatershed include the Cascades frog.

Approximately 0.26 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. The coastal cutthroat spawning occurs from December through June, but the population in the North Lewis River is considered depressed.

A total of 133.1 acres of NWI wetlands were identified within the subwatershed. These wetlands include 60.6 percent freshwater forested/shrub wetland, 19.8 percent freshwater emergent wetland, 18.3 percent riverine wetland, and 1.4 percent freshwater pond.

4.2.4.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 46.01 miles of roads with a road density of 2.59 miles per square mile. It has approximately 7,575,134 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 13 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Lewis River Reach #6

This reach has 7.56 total stream miles under shoreline jurisdiction and 365.29 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.65 miles of roads within the reach's shoreline jurisdiction. It has approximately 125,184 square feet of impervious road surfaces, and no

additional impervious area for structures. No additional altered conditions are known to be present within this reach.

4.2.4.6 Public Access

The subwatershed has 5.76 miles of trails and is fairly accessible from forest service road NF-90 that runs parallel to Lewis River along its northern bank.

4.2.4.7 Restoration Opportunities

The upper Lewis River contains forests that support functioning watershed process conditions and has mature riparian areas. Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities may include upgrading or removing any problem forest roads to minimize impacts to sediment supply and water quality (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.5 Quartz Creek (170800020105) – Map Sheet 2

4.2.5.1 Overview

The Quartz Creek (170800020105) HUC is approximately 19,305 total acres, and includes 600 acres of shoreline jurisdictional area and 12.52 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.1950/-121.8268. The subwatershed is located in the Gifford Pinchot National Forest and includes Hat Rock and Craggy Peak. The HUC is located within the northeast quadrant of Skamania County.

4.2.5.2 Reaches

French Creek: This reach begins east of Hat Rock and continues until its confluence with Quartz Creek. Its downstream location is 46.2503/-121.7668, and its upstream location is 46.2614/-121.7867. This reach is not a shoreline of statewide significance.

Quartz Creek Reach #1: From the confluence of French Creek to the confluence of Snagtooth Creek. Its downstream location is 46.2047/-121.8040, and its upstream location is 46.2503/-121.7668. This reach is not a shoreline of statewide significance.

Quartz Creek Reach #2: From the confluence of Snagtooth Creek to the confluence of Straight Creek. Its downstream location is 46.1950/-121.8268, and its upstream location is 46.2047/-121.8040. This reach is not a shoreline of statewide significance.

Quartz Creek Reach #3: From the confluence of Straight Creek to its confluence with the Lewis River including associated wetlands at the subwatershed boundary. Its downstream location is 46.1794/-121.8470, and its upstream location is 46.1950/-121.8268. This reach is not a shoreline of statewide significance.

Snagtooth Creek: This reach flows north to south until its confluence with Quartz Creek. Its downstream location is 46.2047/-121.8040, and its upstream location is 46.2113/-121.8049. This reach is not a shoreline of statewide significance.

Straight Creek: Located south of Craggy Peak, this reach flows north to south until its confluence with Quartz Creek. Its downstream location is 46.1950/-121.8268, and its upstream location is 46.2339/-121.8417. This reach is not a shoreline of statewide significance.

4.2.5.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-25. The subwatershed also includes approximately 784 acres of landslide hazard zones.

Table 4-25. Surficial Geology and Soil Types - Quartz Creek (170800020105)

Type	Percent
Surficial Geology	
Andesite flows	80.9%
Tuffs and tuff breccias	11.1%
Basalt flows	4.0%
Mass-wasting deposits, mostly landslides	3.9%
Water	Less than 1% each
Soil Types	
Vitric haplocryands, Cind/Med	39.7%
Typic udivitrands, Pum, M, FRG	32.4%
Lithic orthents, andepts, cryands, udands	21.3%
Typic vitricryands, Pum	2.4%
Typic vitricryands, Pum, M	2.3%
Typic udivitrands, Pum/S-SK, FRG	1.3%
Aquolls, fibrists, aquods; and Lithic orthents	Less than 1% each

Vegetated cover within the subwatershed is composed of 85.3 percent forested woodland, 14.2 percent recently disturbed or modified land, 1.66 percent developed other human use, and less than one percent nonvascular or sparse vascular rock vegetation, open water, and shrubland and/or grassland.

4.2.5.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, riverine wetland, talus slopes, and caves or cave-rich areas, as well as habitat for elk. The PHS species within the subwatershed include northern spotted owl, gray wolf, Townsend's big-eared bat, Larch Mountain salamander, Van Dyke's salamander, and Cascade torrent salamander. The monitored non-PHS species within the subwatershed include the Cascades frog and tailed frog.

Approximately 1.03 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. The coastal cutthroat population in the North Lewis River is considered depressed.

A total of 34 acres of NWI wetlands were identified within the subwatershed. These wetlands include 40.2 percent freshwater pond, 39.1 percent freshwater emergent wetland, 19 percent freshwater forested/shrub wetland, and 1.7 percent riverine wetland.

4.2.5.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 30.81 miles of roads with a road density of 1.02 miles per square mile. It has approximately 5,353,487 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 22 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within this subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the four 303(d) listings associated with temperature within this subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

French Creek

This reach has 1.33 total stream miles under shoreline jurisdiction and 65.62 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Quartz Creek Reach #1

This reach has 4.23 total stream miles under shoreline jurisdiction and 202.17 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Quartz Creek Reach #2

This reach has 1.52 total stream miles under shoreline jurisdiction and 72.08 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Quartz Creek Reach #3
This reach has 1.82 total stream miles under shoreline jurisdiction and 87.15 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.08 miles of roads within the reach's shoreline jurisdiction. It has approximately 16,315 square feet of impervious road surfaces, and no additional impervious area from structures. This reach has a State 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Snagtooth Creek
This reach has 0.6 total stream miles under shoreline jurisdiction and 27.41 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Straight Creek
This reach has 3.02 total stream miles under shoreline jurisdiction and 145.81 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.35 miles of roads within the reach's shoreline jurisdiction. It has approximately 67,475 square feet of impervious road surfaces, and no additional impervious area from structures.

4.2.5.6 Public Access
The subwatershed has 30.57 miles of trails and is fairly inaccessible by major roads however forest service roads do provide access to portions of the HUC.

4.2.5.7 Restoration Opportunities
Quartz Creek is listed as an impaired waterbody with regard to stream temperature according to the 303(d) listings associated with temperature within this subwatershed. Restoration opportunities to reduce these water quality impacts may include increasing riparian shading and decreasing channel width-to-depth ratios (Lower Columbia Fish Recovery Board 2010).

4.2.6 Tillicum Creek – Lewis River (170800020106) – Map Sheets 1, 2, and 4

4.2.6.1 Overview
The Tillicum Creek – Lewis River (170800020106) HUC is approximately 211 total acres and includes 550.3 acres of shoreline jurisdictional area, 10.44 miles of streams, and 20.42 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.1543/-121.8819, and its upstream location is 46.1803/-121.8329. The subwatershed is located in the Gifford Pinchot National

Forest east of Steamboat Mountain. The HUC is located approximately equidistance between Mount St. Helens and Mount Adams.

4.2.6.2 Reaches

Alec Creek: This reach flows northwest to south east until its confluence at the Lewis River. Its downstream location is 46.1756/-121.8534, and its upstream location is 46.2025/-121.8852. This reach is not a shoreline of statewide significance.

Lewis River Reach #7: From the confluence of Tillicum Creek to the confluence of Quartz Creek. Its downstream location is 46.1794/-121.8470, and its upstream location is 46.1803/-121.8329. This reach is not a shoreline of statewide significance.

Lewis River Reach #8: From the confluence of Quartz Creek to the confluence of Alec Creek. Its downstream location is 46.1756/-121.8534, and its upstream location is 46.1794/-121.8470. This reach is not a shoreline of statewide significance.

Lewis River Reach #9: From the confluence of Alec Creek to just downstream of Lower Lewis River Falls. Its downstream location is 46.1543/-121.8819, and its upstream location is 46.1756/-121.8534. This reach is not a shoreline of statewide significance.

Tillicum Creek: This reach flows south to north until its confluence with the Lewis River. Its downstream location is 48.1803/-121.8329, and its upstream location is 46.1435/-121.7875. This reach is not a shoreline of statewide significance.

Unnamed Waterbody: This emergent wetland waterbody is located northwest of Tillicum Campground and drains to the non-jurisdictional Upper Tillicum Creek. The center of this waterbody is at 46.1278/-121.7922. This reach is not a shoreline of statewide significance.

4.2.6.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-26. The subwatershed also includes approximately 274.21 acres of landslide hazard zones.

Table 4-26. Surficial Geology and Soil Types - Tillicum Creek – Lewis River (170800020106)

Type	Percent
Surficial Geology	
Andesite flows	52.2%
Continental sedimentary deposits or rocks, conglomerate	22.9%
Basalt flows	13.4%
Tuffs and tuff breccias	9.0%
Mass-wasting deposits, mostly landslides	1.9%
Diorite and water	Less than 1% each
Soil Types	

Type	Percent
Vitric haplocryands, Cind/Med	40.2%
Typic vitricryands, Ashy/Med-SK	21.3%
Typic udivitrands, Pum, M, FRG	17.1%
Typic vitricryands, Pum, M	6.7%
Aquic vitricryands, Ashy/Med-SK	4.5%
Typic vitricryands, Pum	2.9%
Typic udivitrands, Pum/S-SK, FRG	2.9%
Aquolls, fibrists, aquods	1.9%
Lithic orthents, andepts, cryands, udands	1.6%
Andic cryumbrepts, Med/Lo-SK, M; and Typic udivitrands, Cind/Med, FRG	Less than 1% each

Vegetated cover within the subwatershed is composed of 72.1 percent forested woodland, 25.4 percent recently disturbed or modified land, 1.7 percent developed other human use, and less than one percent nonvascular or sparse vascular rock vegetation, and shrubland and/or grassland.

4.2.6.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, riverine wetland, and habitat for elk. The PHS species within the subwatershed include northern spotted owl, northern goshawk, Larch Mountain salamander, and Cascade torrent salamander. The monitored non-PHS species within the subwatershed include tailed frog and osprey.

Approximately 3.73 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. Coastal cutthroat spawning occurs from December through June. The cutthroat population in the North Lewis River is considered depressed.

A total of 211.2 acres of NWI wetlands were identified within the subwatershed. These wetlands include 50.4 percent freshwater forested/shrub wetland, 27.5 percent freshwater emergent wetland, 21.2 percent riverine wetland, and less than one percent freshwater pond.

4.2.6.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 66.36 miles of roads with a road density of 2.89 miles per square mile. It has approximately 10,815,339 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 58 archaeological sites.

The subwatershed has three wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the four 303(d) listings associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Alec Creek

This reach has 2.65 total stream miles under shoreline jurisdiction and 128.14 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.33 miles of roads within the reach. It has approximately 61,131 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Lewis River Reach #7

This reach has 0.79 total stream miles under shoreline jurisdiction and 37.57 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. This reach has a State 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Lewis River Reach #8

This reach has 0.54 total stream miles under shoreline jurisdiction and 25.17 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. This reach has a State 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Lewis River Reach #9

This reach has 2.46 total stream miles under shoreline jurisdiction and 117.82 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.14 miles of roads within the reach. It has approximately 22,392 square feet of impervious road surfaces, and no additional impervious area from structures. This reach has wellhead protection areas associated with Group A and Group B wells. No additional altered conditions are known to be present within this reach.

Tillicum Creek
This reach has 4 total stream miles under shoreline jurisdiction and 191.64 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.23 miles of roads within the reach. It has approximately 36,475 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody
This jurisdictional wetland has a total of 20.42 acres and 49.92 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.2.6.6 Public Access
The subwatershed has 13.76 miles of trails and is fairly accessible from forest service roads. Forest service road NF-90 runs parallel to this portion of the Lewis River.

4.2.6.7 Restoration Opportunities
Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Restoration efforts within this subwatershed should focus on improving water quality from elevated temperatures, restoring channel structure and stability, and riparian conditions. Increasing riparian shading and decreasing channel width-to-depth ratios can improve the water quality affected by temperature. The placement of large woody debris will help to restore channel structure and stability by enhancing cover, pool formation, bank stability, and sediment sorting. Riparian conditions can be restored by eradicating exotic and invasive species (Lower Columbia Fish Recovery Board 2010).

4.2.7 Big Creek (170800020107) – Map Sheets 3 and 4

4.2.7.1 Overview
The Big Creek (170800020107) HUC is approximately 10,281 total acres, and includes 768.41 acres of shoreline jurisdictional area and 7.82 miles of under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.0970/-121.9210. The subwatershed is located within the Gifford Pinchot National Forest, east of Tire Junction.

4.2.7.2 Reaches
Big Creek: The reach includes the headwaters of Big Creek and flows east to west until its confluence with the Lewis River, including associated wetlands in the eastern and central portions of the reach. Its downstream location is 46.0970/-

121.9210, and its upstream location is 46.1041/-121.7948. This reach is not a shoreline of statewide significance.

4.2.7.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-27. The subwatershed also includes approximately 182.72 acres of landslide hazard zones.

Table 4-27. Surficial Geology and Soil Types - Big Creek (170800020107)

Type	Percent
Surficial Geology	
Continental sedimentary deposits or rocks, conglomerate	32.2%
Basalt flows	34%
Andesite flows	10.5%
Basaltic andesite flows	7.4%
Alluvium	7.3%
Alpine glacial till, Fraser-age	4.8%
Mass-wasting deposits, mostly landslides	1.8%
Tuffs and tuff breccias	1.4%
Alpine glacial drift and water	Less than 1% each
Soil Types	
Typic vitricryands, Pum, M	24.6%
Typic vitricryands, Pum	19.8%
Aquic vitricryands, Ashy/Med-SK	16.1%
Typic udivitrands, Pum, M, FRG	13.8%
Aquolls, fibrists, aquods	10.0%
Vitric haplocryands, cind/med	8.7%
Andic haplumbrepts, Med/Lo-SK, M, FRG	2.8%
Andic cryumbrepts, Med/Lo-SK, M	2.6%
Lithic orthents, andepts, cryands, udands	Less than 1% each

Vegetated cover within the subwatershed is composed of 73.1 percent forested woodland, 18.6 percent recently disturbed or modified land, 6 percent shrubland and/or grassland, 2.3 percent developed other human use, and less than one percent open water.

4.2.7.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, and habitat for elk. The PHS species within the subwatershed include northern spotted owl and northern goshawk.

Approximately 3.34 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. The coastal cutthroat population in the North Lewis River is considered depressed.

A total of 700.2 acres of NWI wetlands were identified within the subwatershed. These wetlands include 56.1 percent freshwater forested/shrub wetland, 42.2 percent freshwater emergent wetland, and 1.6 percent freshwater pond.

4.2.7.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 38.85 miles of roads with a road density of 2.42 miles per square mile. It has approximately 6,345,239 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 27 archaeological sites.

The subwatershed has one wellhead protection area associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

Big Creek

This reach has 7.82 total stream miles under shoreline jurisdiction and 768.41 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.27 miles of roads within the reach's shoreline jurisdiction. It has approximately 54,214 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

4.2.7.6 Public Access

The subwatershed has 13.54 miles of trails and is fairly accessible from Twin Buttes Road as well as forest service roads.

4.2.7.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but potential restoration opportunities may include the protection of instream flows through management of water withdrawals, channel structure and stability, natural stream flow regime, and access to habitats (Lower Columbia Fish Recovery Board 2010).

4.2.8 Cussed Hollow – Lewis River (170800020108) – Map Sheets 1 and 3

4.2.8.1 Overview

The Cussed Hollow – Lewis River (170800020108) HUC is approximately 363 total acres and includes 542.32 acres of shoreline jurisdictional area, 9.06 miles of streams, and 54.78 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.0970/-121.9210, and its upstream location

is 46.1543/-121.8819. This subwatershed includes the reaches of the Lewis River from just downstream of Lower Lewis River Falls to the confluence with Big Creek. It is located within the Gifford Pinchot National Forest, in the central portion of the county.

4.2.8.2 Reaches

Chickoon Creek: This reach begins at the confluence of an unnamed tributary and continues to its confluence at the Lewis River. Its downstream location is 46.1534/-121.8844, and its upstream location is 46.1452/-121.8684. This reach is not a shoreline of statewide significance.

Cussed Hollow: This stream reach flows north to south until its confluence at the Lewis River. Its downstream location is 46.1439 -121.9016, and its upstream location is 46.1727/-121.9115. This reach is not a shoreline of statewide significance.

Lewis River Reach #10: This reach begins downstream of Lower Lewis River Falls to the confluence of Chickoon Creek. Its downstream location is 46.1534/-121.8844, and its upstream location is 46.1543/-121.8819. This reach is not a shoreline of statewide significance.

Lewis River Reach #11: From the confluence of Chickoon Creek to the confluence of Cussed Hollow. Its downstream location is 46.1439/-121.9016, and its upstream location is 46.1534/-121.8844. This reach is not a shoreline of statewide significance.

Lewis River Reach #12: From the confluence of Cussed Hollow the confluence of Big Creek. Its downstream location is 46.0970/-121.9210, and its upstream location is 46.1439/-121.9016. This reach is not a shoreline of statewide significance.

Spencer Meadow: This freshwater emergent wetland waterbody drains to Cussed Hollow. The center of this waterbody is at 46.1792/-121.9289. This reach is not a shoreline of statewide significance.

4.2.8.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-28. The subwatershed also includes approximately 228.82 acres of landslide hazard zones.

Table 4-28. Surficial Geology and Soil Types - Cussed Hollow – Lewis River (170800020108)

Type	Percent
Surficial Geology	
Andesite flows	73.2%
Continental sedimentary deposits or rocks, conglomerate	12.9%
Tuffs and tuff breccias	11.6%
Mass-wasting deposits, mostly landslides	1.5%
Alluvium	Less than 1% each

Type	Percent
Soil Types	
Vitric haplocryands, Cind/Med	46.8%
Typic udivitrands, Pum, M, FRG	21.1%
Typic vitricryands, Pum, M	12.2%
Typic udivitrands, Cind/Med, FRG	6.0%
Aquic vitricryands, Ashy/Med-SK	5.3%
Typic udivitrands, Pum/s-sk, FRG	3.9%
Lithic orthents, andepts, cryands, udands	2.3%
Typic vitricryands, Ashy/Med-SK; and aquolls, fibrists, and aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 89.5 percent forested woodland, 9.7 percent recently disturbed or modified land, and less than one percent developed other human use, and shrubland and/or grassland.

4.2.8.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, lake, and habitat for elk. The PHS species within the subwatershed include northern spotted owl, northern goshawk and Cascade torrent salamander. The monitored non-PHS species within the subwatershed includes the tailed frog. Approximately 5.41 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed.

A total of 363.1 acres of NWI wetlands were identified within the subwatershed. These wetlands include 66 percent freshwater forested/shrub wetland, 17.5 percent riverine, 15.7 percent freshwater emergent wetland, and less than one percent freshwater pond.

4.2.8.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned.

The subwatershed has approximately 36.71 miles of roads with a road density of 1.53 miles per square mile. It has approximately 6,313,585 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 10 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within the subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the five 303(d) listings associated with temperature

within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Chickoon Creek

This reach has 1.26 total stream miles under shoreline jurisdiction and 60.28 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Cussed Hollow

This reach has 2.33 total stream miles under shoreline jurisdiction and 112.45 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Lewis River Reach #10

This reach has 0.14 total stream miles under shoreline jurisdiction and 6.32 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Lewis River Reach #11

This reach has 1.27 total stream miles under shoreline jurisdiction and 60.42 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.30 miles of roads within the reach's shoreline jurisdiction. It has approximately 60,180 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Lewis River Reach #12

This reach has 4.06 total stream miles under shoreline jurisdiction and 194.94 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. Three 303(d) listings associated with temperature is located within this reach. No additional altered conditions are known to be present within this reach.

Spencer Meadow

This reach has a total of 54.78 acres and 107.91 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

The reach's shoreline jurisdiction has approximately 0.27 miles of roads and a road density of 1.62 miles per square mile. It has approximately 50,248 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

4.2.8.6 Public Access

The subwatershed has 15.25 miles of trails and is fairly accessible from forest service roads. Forest service road NF-90 runs parallel to this portion of the Lewis River.

4.2.8.7 Restoration Opportunities

Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Restoration efforts within this subwatershed should be focused on improving water quality as a result of elevated temperatures, and restoring channel structure and stability and riparian conditions. Increasing riparian shading and decreasing channel width-to-depth ratios can improve the water quality affected by temperature. The placement of large woody debris will help to restore channel structure and stability by enhancing cover, pool formation, bank stability, and sediment sorting. Riparian conditions can be restored by eradicating exotic and invasive species (Lower Columbia Fish Recovery Board 2010).

4.2.9 Rush Creek (170800020109) – Map Sheets 3 and 4

4.2.9.1 Overview

The Rush Creek (170800020109) HUC is approximately 17,211 total acres and includes 875.16 acres of shoreline jurisdictional area, 9.51 miles of streams, and 125.51 acres of waterbodies under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.0745/-121.9378. The subwatershed is located within the Gifford Pinchot National Forest, west of Cultus Creek Campground and Indian Heaven Wilderness, and within the central portion of the county.

Rush Creek (Skamania County 2015a)

4.2.9.2 Reaches

Meadow Creek Reach #1: This reach begins near the intersection of Forest Roads NF-32 and NF-121 and continues downstream flowing north to south. Its downstream location is 46.0628/-121.8528, and its upstream location is 46.0658/-121.8503. This reach is not a shoreline of statewide significance.

Meadow Creek Reach #2: This reach flows in the general northeast to southwest direction until its confluence with Rush Creek. Its downstream location is 46.0393/-121.8748, and its upstream location is 46.0597/-121.8556. This reach is not a shoreline of statewide significance.

Rush Creek Reach #1: This reach begins just downstream of forest service road NF-65 and continues until the confluence of Meadow Creek. Its downstream location is 46.0393/-121.8748, and its upstream location is 46.0309/-121.8371. This reach is not a shoreline of statewide significance.

Rush Creek Reach #2: From the confluence of Meadow Creek to its confluence with the Lewis River. Its downstream location is 46.0745/-121.9378, and its upstream location is 46.0393/-121.8748. This reach is not a shoreline of statewide significance.

Lone Butte Meadows: This waterbody is located adjacent to Meadow Creek east of Crazy Hills. The center of this waterbody is at 46.0734/-121.8404. This reach is not a shoreline of statewide significance.

Placid Lake: This waterbody is located north of Rush Creek headwaters. The center of this waterbody is at 46.0416/-121.8170. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #1: This freshwater emergent wetland waterbody is located west of Meadow Creek between forest service roads NF-121 and NF-32. The center of this waterbody is at 46.0778/-121.8486. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #2: This associated wetland northerly extension of Meadow Creek, is located southeast of Crazy Hills. The center of this waterbody is at 46.0619/-121.8553. This reach is not a shoreline of statewide significance.

4.2.9.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-29.

Table 4-29. Surficial Geology and Soil Types - Rush Creek (170800020109

Type	Percent
Surficial Geology	
Basalt flows	67.4%
Alpine glacial till, Fraser-age	27.0%
Alluvium	2.9%
Basaltic andesite flows	1.5%
Tuffs and tuff breccias, and water	Less than 1% each
Soil Types	
Typic vitricryands, Pum, M	43.2%
Typic vitricryands, Pum	28.5%
Andic haplumbrepts, med/lo-sk, m, FRG	7.2%
Aquic vitricryands, Ashy/Med-SK	7.0%
Vitric haplocryands, Cind/Med	7.0%
Aquolls, fibrists, aquods	2.5%
Typic vitricryands, Ashy/Med-SK	2.3%
Lithic orthents, andepts, cryands, udands; Typic udivitrands, Pum/S-SK, FRG; orthents, andepts, and cryands	Less than 1% each

Vegetated cover within the subwatershed is composed of 56.5 percent forested woodland, 39.1 percent recently disturbed or modified land, 2.2 percent shrubland and/or grassland, 1.9 percent developed other human use, and less than one percent open water.

4.2.9.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, lake, and habitat for elk. The PHS species within the subwatershed include northern spotted

owl, western toad, and marten. The monitored non-PHS species within the subwatershed includes the Cascades frog.

Approximately 5.41 stream miles of Lewis coastal cutthroat habitat and 2.68 miles of Lewis River bull trout are found within the subwatershed. The coastal cutthroat population in the North Lewis River is considered depressed and their spawning occurs from December through June. Spawning of the Swift reservoir population of bull trout occurs in Rush Creek, which is known for its moderately healthy population (Lower Columbia Fish Recovery Board 2010).

A total of 658.4 acres of NWI wetlands were identified within the subwatershed. These wetlands include 41.5 percent freshwater forested/shrub wetland, 38.3 percent freshwater emergent wetland, 17.7 percent freshwater pond, and 2.4 percent lake.

4.2.9.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 54.05 miles of roads with a road density of 2.01 miles per square mile. It has approximately 8,907,063 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 15 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Meadow Creek Reach #1

This reach has 0.27 total stream miles under shoreline jurisdiction and 23.47 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Meadow Creek Reach #2

This reach has 2.45 total stream miles under shoreline jurisdiction and 119.26 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.12 miles of roads within the reach. It has approximately 20,192 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Rush Creek Reach #1
This reach has 2.44 total stream miles under shoreline jurisdiction and 118.07 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.09 miles of roads within the reach's shoreline jurisdiction. It has approximately 21,182 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Rush Creek Reach #2
This reach has 4.35 total stream miles under shoreline jurisdiction and 208.03 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.10 miles of roads within the reach's shoreline jurisdiction. It has approximately 20,559 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Lone Butte Meadows
This reach has a total of 73.02 acres and 265.61 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.38 miles of roads within the reach's shoreline jurisdiction. It has approximately 55,432 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Placid Lake
This reach has a total of 16.55 acres and 39.79 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #1
This reach has a total of 15.60 acres and 46.37 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.58 miles of roads within the reach's shoreline jurisdiction. It has approximately 91,925 square feet of impervious road surfaces, and no

additional impervious area from structures. No additional altered conditions are known to be present within this reach.

***Unnamed Waterbody* #2**

This reach has a total of 20.34 acres and 54.56 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.2.9.6 Public Access

The subwatershed has 24.86 miles of trails and is accessible from forest service roads and local roads including Meadow Creek Road and Curly Creek Road.

4.2.9.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but targeted riparian and stream channel restoration may benefit fish habitat within Rush Creek. Riparian conditions can be improved with the planting of native species and eradicating invasive plant species from the riparian areas. Stream channel structure and stability can be improved by structurally modifying channel morphology to create suitable habitat and/or by the placement of large woody debris to enhance cover, pool formation, bank stability and sediment sorting (USFS 2016b, Lower Columbia Fish Recovery Board 2010).

4.2.10 Curly Creek (170800020110) – Map Sheet 3

4.2.10.1 Overview

The Curly Creek (170800020110) HUC is approximately 12,244 total acres and includes 333.39 acres of shoreline jurisdictional area and 5.21 miles of under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.0593/-121.9732. The subwatershed is located within the central portion of Skamania County and within the Gifford Pinchot National Forest. The HUC is located east of the Swift Reservoir and northwest of McClellan Sno-Park.

Curly Creek (Skamania County 2015a)

4.2.10.2 Reaches

Curly Creek: Flows north then northwest from the confluence of Outlaw Creek to its confluence with the Lewis River at the subwatershed boundary. Its downstream location is 46.0593/-121.9732, and its upstream location is 46.0321/-121.9145. This reach is not a shoreline of statewide significance.

Hardtime Creek: This reach flows northeast from just east or downstream of forest road NF-3050 and continues until its confluence with Outlaw Creek. Its downstream location is 46.0302/-121.9156, and its upstream location is 46.0254/-121.9199. This reach is not a shoreline of statewide significance.

Outlaw Creek Reach #1: This reach flows from southeast to northwest until the confluence of Hardtime Creek south of Curly Creek Road. Its downstream location is 46.0302/-121.9156, and its upstream location is 46.0264/-121.9107. This reach is not a shoreline of statewide significance.

Outlaw Creek Reach #2: A short reach from the confluence of Hardtime Creek south of Curly Creek Road to its confluence with Curly Creek north of Curly Creek Road. Its downstream location is 46.0321/-121.9145, and its upstream location is 46.0302/-121.9156. This reach is not a shoreline of statewide significance.

4.2.10.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-30.

Table 4-30. Surficial Geology and Soil Types - Curly Creek (170800020110)

Type	Percent
Surficial Geology	
Basalt flows	48.4%
Andesite flows	40.0%
Alpine glacial till, Fraser-age	5.5%
Basaltic andesite flows	5.3%
Alpine glacial drift, Fraser-age; and water	Less than 1% each
Soil Types	
Typic vitricryands, Pum, M	21.3%
Andic haplumbrepts, Med/Lo-SK, M, FRG	14.7%
Aquic vitricryands, Ashy/Med-SK	14.2%
Typic udivitrands, Pum, M, FRG	12.4%
Typic vitricryands, Ashy/Med-SK	12.0%
Typic vitricryands, Pum	9.6%
Vitric haplocryands, Cind/Med	7.6%
Typic udivitrands, Pum/S-SK, FRG	4.3%
Lithic orthents, andepts, cryands, udands	1.7%
Aquolls, fibrists, aquods	1.6%
Orthents, andepts, cryands	Less than 1% each

Vegetated cover within the subwatershed is composed of 59.9 percent forested woodland, 38.3 percent recently disturbed or modified land, and less than one percent developed other human use, nonvascular or sparse vascular rock vegetation, open water, and shrubland and/or grassland.

4.2.10.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, cave or cave-rich areas, and habitat for elk. The PHS species within the subwatershed include northern spotted owl and Townsend's big-eared bat. The monitored non-PHS species within the subwatershed include the tailed frog, Cascades frog and great gray owl.

A total of 396.1 acres of NWI wetlands were identified within the subwatershed. These wetlands include 65 percent freshwater forested/shrub wetland, 21.3 percent freshwater emergent wetland, and 13.7 percent freshwater pond.

4.2.10.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of it is publicly owned and it is entirely unzoned.

The subwatershed has approximately 48.28 miles of roads with a road density of 2.52 miles per square mile. The subwatershed has approximately 396 square feet of impervious surfaces from structures and 8,152,217 square feet of impervious road surfaces for a total of 8,152,612 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include 26 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within this subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Curly Creek

This reach has 4.30 total stream miles under shoreline jurisdiction and 204.9 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.55 miles of roads within the reach's shoreline jurisdiction. It has approximately 94,500 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Hardtime Creek

This reach has 0.40 total stream miles under shoreline jurisdiction and 19.87 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.04 miles of roads within the reach's shoreline jurisdiction. It has approximately 7,015 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Outlaw Creek Reach #1

This reach has 0.37 total stream miles under shoreline jurisdiction and 18.19 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Outlaw Creek Reach #2

This reach has 0.14 total stream miles under shoreline jurisdiction and 6.76 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.09 miles of roads within the reach's shoreline jurisdiction. It has approximately 19,852 square feet of impervious road surfaces, and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

4.2.10.6 Public Access

The subwatershed has 20.21 miles of trails and is fairly accessible from forest service roads and local roads including Meadow Creek Road and Curly Creek Road.

4.2.10.7 Restoration Opportunities

Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed. Restoration opportunities may include restoring the riparian conditions and channel structure. Riparian conditions can be improved with the planting of native species and eradicating invasive plant species from the riparian areas. Stream channel structure and stability can be improved by structurally modifying channel morphology to create suitable habitat and/or by the placement of large woody debris to enhance cover, pool formation, bank stability and sediment sorting (USFS 2016b, Lower Columbia Fish Recovery Board 2010).

4.2.11 Little Creek – Lewis River (170800020111) – Map Sheets 3 and 3b

4.2.11.1 Overview

The Little Creek – Lewis River (170800020111) HUC is approximately 12,517.57 total acres and includes 391.18 acres of shoreline jurisdictional area and 7.31 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.0697/-122.0062, and its upstream location is 46.0970/-121.9210. The subwatershed is located within the central portion of Skamania County. It is largely within the Gifford Pinchot National Forest and located east of the Swift Reservoir.

4.2.11.2 Reaches

Lewis River Reach #13: Flows southwest from the confluence of Big Creek to the confluence of Rush Creek. Its downstream location is 46.0745/-121.9378, and its upstream location is 46.0970/-121.9210. Portions of this reach are a shoreline of statewide significance.

Lewis River Reach #14: Flows southwest from the confluence of Rush Creek to the confluence of Curly Creek. Its downstream location is 46.0593/-121.9732, and its upstream location is 46.0745/-121.9378. Portions of this reach are a shoreline of statewide significance.

Lewis River Reach #15: Flows west from the confluence of Curly Creek to the confluence of Miller Creek. Its downstream location is 46.0584/-121.9757, and its upstream location is 46.0593/-121.9732. Portions of this reach are a shoreline of statewide significance.

Lewis River Reach #16: Flows northwest from the confluence of Miller Creek to the confluence of Pepper Creek. Its downstream location is 46.0711/-121.9928, and its upstream location is 46.0584/-121.9757. Portions of this reach are a shoreline of statewide significance.

Lewis River Reach #17: Flows west from the confluence of Pepper Creek to the confluence of the Muddy River. Its downstream location is 46.0697/-122.0062, and its upstream location is 46.0711/-121.9928. Portions of this reach are a shoreline of statewide significance.

Miller Creek: This reach flows northwest from just downstream of forest road NF-90 to its confluence with the Lewis River. Its downstream location is 46.0584/-121.9757, and its upstream location is 46.0540/-121.9718. This reach is not a shoreline of statewide significance.

Pepper Creek: This reach flows southwest from just downstream of forest road NF-9039 to its confluence with the Lewis River. Its downstream location is 46.0711/-121.9928, and its upstream location is 46.0741/-121.9873. This reach is not a shoreline of statewide significance.

4.2.11.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-31. The subwatershed also includes approximately 102.53 acres of landslide hazard zones.

Table 4-31. Surficial Geology and Soil Types - Little Creek - Lewis River (170800020111)

Type	Percent
Surficial Geology	
Tuffs and tuff breccias	36.1%
Andesite flows	28.8%
Basalt flows	24.9%
Alluvium	5.2%
Volcanoclastic deposits or rocks	3.3%
Mass-wasting deposits, mostly landslides; alpine glacial drift; water; and lahars	Less than 1% each
Soil Types	
Vitric haplocryands, Cind/Med	30.0%
Typic udivitrands, Pum, M, FRG	26.6%
Typic udivitrands, Cind/Med, FRG	18.9%
Typic udivitrands, Pum/S-SK, FRG	9.4%
Typic vitricryands, Pum, M,	4.7%
Typic vitricryands, Ashy/Med-SK	2.8%
Unclassified	1.7%
Lithic orthents, andepts, cryands, udands	1.6%
Aquic vitricryands, Ashy/Med-SK	1.6%

Type	Percent
Aquolls, fibrists, aquods; Andic haplumbrepts, Med/Lo-SK, M, FRG; Cinnamon sandy loam, 2 to 30% slopes, Swift cindery sandy loam, 30 to 65% slopes; Swift-rock outcrop complex, 65 to 90% slopes; Pinchot cindery sandy loam, 0 to 30% slopes; Bonneville stony sandy loam; Pinchot cindery sandy loam, 50 to 90% slopes; water; riverwash; and Yale lake sandy loam, 2 to 30% slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 61.4 percent forested woodland, 38.1 percent recently disturbed or modified land, and less than one percent developed other human use, nonvascular or sparse vascular rock vegetation, open water, and shrubland and/or grassland. See Map 5 for pCMZs within this subwatershed.

4.2.11.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, riverine wetland, cave or cave-rich areas, talus slopes, and habitat for elk and bald eagles. The PHS species within the subwatershed include northern spotted owl and bald eagles. The monitored non-PHS species within the subwatershed includes osprey.

Approximately 6.92 stream miles of Lewis coastal cutthroat habitat and 6.48 miles of Lewis River bull trout are found within the subwatershed. The coastal cutthroat population in the North Lewis River is considered depressed and WDFW considers Lewis River bull trout to be at moderate risk of extinction (Lower Columbia Fish Recovery Board 2010).

A total of 121.1 acres of NWI wetlands were identified within the subwatershed. These wetlands include 66 percent riverine wetland, 18.2 percent freshwater emergent wetland, and 15.8 percent freshwater forested/shrub wetland.

4.2.11.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 99.6 percent government services; and less than one percent mining and extraction establishments; residence or accommodation functions; and agriculture, forestry, fishing, and hunting uses. Approximately less than percent of the subwatershed is privately owned and 99.7 percent is publicly owned. In terms of zoning, the watershed is 98.9 percent unzoned, and less than one percent residential – lower density and forestry.

The subwatershed has approximately 51.17 miles of roads and a road density of 2.62 miles per square mile. It has approximately 8,416,214 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archeological, cultural, or historical resources within the subwatershed include one historic property and 19 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within the subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Lewis River Reach #13

This reach has 2.17 total stream miles under shoreline jurisdiction and 131.84 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Lewis River Reach #14

This reach has 2.12 total stream miles under shoreline jurisdiction and 103.68 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.12 miles of roads within the reach's shoreline jurisdiction. It has approximately 18,463 square feet of impervious road surfaces, and no additional impervious area from structures. This reach has a 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Lewis River Reach #15

This reach has 0.14 total stream miles under shoreline jurisdiction and 6.02 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. This reach has a 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Lewis River Reach #16

This reach has 1.37 total stream miles under shoreline jurisdiction and 73.58 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach.

Lewis River Reach #17

This reach has 0.80 total stream miles under shoreline jurisdiction and 40.61 acres of shoreline jurisdictional area. The existing land uses within this reach are 52.7 percent government services; 36.8 percent undefined; 7 percent residence or accommodation functions; 1.9 percent mining and extraction establishments; and 1.5 percent agriculture, forestry, fishing and hunting uses. Approximately 10.5 percent of the reach is privately owned and 89.5 percent is publicly owned. In terms of zoning, the

reach is 65.7 percent residential – lower density, 32.4 percent unzoned, and 1.9 percent forest. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Miller Creek
This reach has 0.37 total stream miles under shoreline jurisdiction and 18.37 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.03 miles of roads within the reach's shoreline jurisdiction. It has approximately 4,743 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

Pepper Creek
This reach has 0.34 total stream miles under shoreline jurisdiction and 17.08 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.05 miles of roads within the reach's shoreline jurisdiction. It has approximately 7,813 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

4.2.11.6 Public Access
The subwatershed has 4.87 miles of trails and is fairly accessible from forest service roads and local roads including Curly Creek Road/NF-90.

4.2.11.7 Restoration Opportunities
Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed. Restoration opportunities should focus on restoring riparian conditions, addressing water quality issues, and restoring channel structure and stability. Riparian conditions can be improved with the planting of native species and eradicating invasive plant species from the riparian areas. Increasing riparian shading and/or decreasing channel width-to-depth ratios will help to decreased elevated stream temperatures. Stream channel structure and stability can be improved by structurally modifying channel morphology to create suitable habitat and/or by the placement of large woody debris to enhance cover, pool formation, bank stability and sediment sorting (USFS 2016b, Lower Columbia Fish Recovery Board 2010).

4.2.12 Upper Muddy River (170800020201) – Map Sheet 1

4.2.12.1 Overview
The Upper Muddy River (170800020201) HUC is approximately 18,444.02 total acres and includes 632.43 acres of shoreline jurisdictional area and 12.56 miles of streams

under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is approximately 46.1832/-122.0540. This subwatershed is located within the Muddy River subbasin in the northwestern quadrant of Skamania County and east of the Mount Saint Helens National Volcanic Monument. The subwatershed is mostly located on U.S. Forest land.

4.2.12.2 Reaches

Ape Canyon: From its headwaters to its confluence with Smith Creek Reach #2 and Smith Creek Reach #3. Its downstream location is 46.2079/-122.0849, and its upstream location is 46.1990/-122.1131. This reach is not a shoreline of statewide significance.

Muddy River Reach #1: From its headwaters to its confluence with Muddy River Reach #2 at the Upper Muddy River HUC/Lower Muddy River HUC boundary and Smith Creek Reach #3. Its downstream location is 46.1832/-122.0540, and its upstream location is 46.1683/-122.1008. This reach is not a shoreline of statewide significance.

Nelson Glacier: From its headwaters to its confluence with Smith Creek Reach #1 and Smith Creek Reach #2. Its downstream location is 46.2242/-122.0897, and its upstream location is 46.2330/-122.1284. This reach is not a shoreline of statewide significance.

Smith Creek Reach #1: From its headwaters to its confluence with Nelson Glacier and Smith Creek Reach #2. Its downstream location is 46.2242/-122.0897, and its upstream location is 46.2408/-122.0923. This reach is not a shoreline of statewide significance.

Smith Creek Reach #2: From its confluence with Nelson Glacier and Smith Creek Reach #1 to its confluence with Ape Canyon and Smith Creek Reach #3. Its downstream location is 46.2079/-122.0849, and its upstream location is 46.2242/-122.0897. This reach is not a shoreline of statewide significance.

Smith Creek Reach #3: From its confluence with Ape Canyon and Muddy River Reach #2 to its confluence with Muddy River Reach #1 and Muddy River Reach #2 at the Upper Muddy River HUC/Lower Muddy River HUC boundary. Its downstream location is 46.1832/-122.0540, and its upstream location is 46.2079/-122.0849. This reach is not a shoreline of statewide significance.

4.2.12.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in

Table 4-32. The subwatershed also includes approximately 59.92 acres of landslide hazard zones.

Table 4-32. Surficial Geology and Soil Types - Upper Muddy River (170800020201)

Type	Percent
Surficial Geology	
Andesite Flows	34.43%
Volcaniclastic Deposits or Rocks	33.08%
Tuffs and tuff Breccias	13.03%
Lahars	12.2%
Granodiorite	1.92%
Diorite	1.74%
Pyroclastic Flows	1.47%
Alluvium; Basalt Flows; Dacite Flows; Glacial Drift, Undivided; Ice; Intrusive Andesite and Dacite; Mass-Wasting Deposits, Mostly Landslides; Volcanic Rocks; Water	Less than 1% each
Soil Types	
Pelee overblown-Rock outcrop complex, 65 to 90% slopes	10.9%
Obscurity very bouldery sand, 0 to 30% slopes	10.1%
Rock outcrop-Rubbleland complex	8.3%
Sinnice extremely cindery loamy sand, overblown, 65 to 90% slopes	7.3%
Wakepish very gravelly sandy loam, 0 to 30% slopes	4.9%
Pelee extremely cindery loamy sand, overblown, 65 to 90% slopes	4.6%
Sinnice, overblown, cold-Rock outcrop complex, 65 to 90% slopes	3.9%
Cryandepts extremely cindery loamy sand, overblown, 45 to 120% slopes	3.7%
Sinnice extremely cindery loamy sand, overblown, 30 to 65% slopes	3.6%
Pelee sandy loam, 65 to 90% slopes	2.3%
Vanson, overblown-Rock outcrop complex, 65 to 90% slopes	2.2%
Pelee sandy loam, 30 to 65% slopes	2.0%
Sinnice extremely cindery loamy sand, overblown, cold, 30 to 65% slopes	1.7%
Pelee extremely cindery loamy sand, overblown, 30 to 65% slopes	1.4%
Studebaker very gravelly loamy sand, 0 to 20% slopes	1.2%
Typic Udivitrands (PUM, M, FRG)	1.1%
Pelee sandy loam, 5 to 30% slopes	1.0%
Swift-Rock outcrop complex, 65 to 90% slopes	1.0%
Vitric Haplocryands (CIND/MED)	1.0%
Cryandepts, 45 to 120% slopes; Elkprairie loamy sand, 5 to 30% slopes; Forsyth cobbly loamy sand, 0 to 30% slopes; Hatchet, overblown-Rock outcrop complex, 65 to 90% slopes; Lithic Orthents, Andepts, Cryands, Udands; Lithic Umbric Vitrandepts, 0 to 15% slopes; Lonestar cindery sandy loam, 30 to 65% slopes; Minniepeak extremely cindery loamy sand, overblown, 30 to 65% slopes; Minniepeak extremely cindery loamy sand, overblown, 65 to 90% slopes; N/A; Polepatch extremely bouldery loamy sand, 0 to 30% slopes; Polepatch extremely bouldery loamy sand, cold, 0 to 30% slopes; Sinnice	Less than 1% each

Type	Percent
extremely cindery loamy sand, overblown, cold, 5 to 30% slopes; Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90% slopes; Typic Udivitrands (CIND/MED, FRG); Vanson-Rock outcrop complex, 65 to 90% slopes; Vanson, overblown-Rock outcrop complex, 30 to 65% slopes; Water	

Vegetated cover within the subwatershed is composed of 53.84 percent recently disturbed or modified land, 28.62 percent forested woodland, 16.58 percent nonvascular or sparse vascular rock vegetation, and less than one percent of each of the following: developed other human use, open water, and shrubland and/or grassland.

4.2.12.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, "other" type of wetland, and riverine wetland. The PHS species within the subwatershed include northern spotted owl and northern goshawk. There are no designated stream miles of fish habitat within the subwatershed.

A total of 118.10 acres of NWI wetlands were identified within the subwatershed. These wetlands include 95.27 percent riverine wetland, 2.67 percent freshwater forested/shrub wetland, 1.52 percent freshwater pond, and less than one percent of freshwater emergent wetland and "other" type of wetland.

4.2.12.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services. The entire subwatershed is publicly owned and it is entirely unzoned. The subwatershed has approximately 30.84 miles of roads with a road density of 1.07 miles per square mile. The subwatershed has approximately 281 square feet of impervious surface from structures and 5,407,314 square feet of impervious road surfaces for a total of 5,407,595 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed includes one archaeological site.

The subwatershed has one wellhead protection area. No State 303d water quality issues have been identified within this subwatershed.

Ape Canyon

This reach has 1.59 total stream miles under shoreline jurisdiction and 76.85 acres of shoreline jurisdictional area. The only existing land use within the reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no designated roads or impervious surface within this reach. No additional altered conditions are known to be present within this reach.

Muddy River #1
This reach has 3.22 total stream miles under shoreline jurisdiction and 155.99 acres of shoreline jurisdictional area. The only existing land use within the reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.21 miles of roads within the reach's shoreline jurisdiction. It has approximately 38,283.87 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Nelson Glacier
This reach has 2.37 total stream miles under shoreline jurisdiction and 115.59 acres of shoreline jurisdictional area. The only existing land use within the reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no designated roads or impervious surface within this reach's shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Smith Creek #1
This reach has 1.44 total stream miles under shoreline jurisdiction and 69.63 acres of shoreline jurisdictional area. The only existing land use within the reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no designated roads or impervious surface within this reach's shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Smith Creek #2
This reach has 1.28 total stream miles under shoreline jurisdiction and 59.85 acres of shoreline jurisdictional area. The only existing land use within the reach is government services. All of the reach is publicly owned and it is entirely unzoned. It has approximately 20,044.51 square feet of impervious road surfaces within the reach's shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Smith Creek #3
This reach has 2.65 total stream miles under shoreline jurisdiction and 154.51 acres of shoreline jurisdictional area. The only existing land use within the reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.27 miles of roads within the reach's shoreline jurisdiction. It has approximately 43,365.58 square feet of impervious road surfaces.

4.2.12.6 Public Access
The subwatershed has 20.78 miles of trails. There are no boat ramps, golf courses, or parks. Ape Canyon, Nelson Glacier, Muddy River Reach #1, Smith Creek Reach #1,

and Smith Creek Reach #2 are relatively inaccessible by roads. The southern portion of Smith Creek Reach #3 is relatively accessible from NF-83.

4.2.12.7 Restoration Opportunities

The Upper Muddy River HUC is located within the Muddy River subbasin. Channel widening from intense timber harvest, as well as the 1980 mudflows and loss of riparian vegetation from the eruption of Mount Saint Helens, have affected water quality and stream temperatures in the Muddy River subbasin (Washington State Conservation Commission 2000b). Ecological conditions within this subwatershed are generally in good condition, but some potential restoration actions within the subbasin and subwatershed include managing forest practices and development activities to minimize impacts to sediment supply processes, runoff regime, and water supply in order to improve turbidity, embedded substrates, water quality, and stream flow.

4.2.13 Clearwater Creek (170800020202) – Map Sheet 1

4.2.13.1 Overview

The Clearwater Creek (170800020202) HUC is approximately 25,372.21 total acres and includes 731.85 acres of shoreline jurisdictional area and 14.65 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is approximately 46.1667/-122.032. This subwatershed is located within the Muddy River subbasin in the northwestern quadrant of Skamania County and east of the Mount Saint Helens National Volcanic Monument. The subwatershed is located on U.S. Forest land.

Clearwater Creek (Skamania County 2015a)

4.2.13.2 Reaches

Clearwater Creek Reach #1: From its headwaters to its confluence with Bean Creek and Clearwater Creek Reach #2. Its downstream location is 46.2226/-122.0259, and its upstream location is 46.2923/-122.0547. This reach is not a shoreline of statewide significance.

Clearwater Creek Reach #2: From its confluence with Bean Creek and Clearwater Creek Reach #1 to the Clearwater Creek HUC/Lower Muddy River HUC boundary. Its downstream location is 46.1667/-122.0321 and its upstream location is 46.2226/-122.0259. This reach is not a shoreline of statewide significance.

Bean Creek: From its headwaters to its confluence with Clearwater Creek Reach #1 and Clearwater Creek Reach #2. Its downstream location is 46.2226/-122.0259, and its upstream location is 46.2501/-122.0518. This reach is not a shoreline of statewide significance.

4.2.13.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-33. The subwatershed also includes approximately 66.50 acres of landslide hazard zones.

Table 4-33. Surficial Geology and Soil Types - Clearwater Creek (170800020202)

Type	Percent
Surficial Geology	
Andesite Flows	32.45%
Tuffs and Tuff Breccias	30.1%
Alluvium	12.24%
Dacite Flows	9.06%
Volcaniclastic Deposits or Rocks	7.33%
Basalt Flows	5.25%
Alpine Glacial Till, Pre-Fraser	1.07%
Basaltic Andesite Flows; Granodiorite; Glacial drift, Undivided; Quartz Diorite; Mass-Wasting Deposits, mostly Landslides; Lahars; Alpine Glacial Drift, pre-Fraser; Water	Less than 1% each
Soil Types	
Vitric Haplocryands (CIND/MED)	35.0%
Typic Udivitrands (CIND/MED, FRG)	23.5%
Typic Udivitrands PUM, M, FRG	9.5%
Typic Udivitrands (PUM/S-SK, FRG)	6.2%
Sinnice extremely cindery loamy sand, overblown, 65 to 90% slopes	5.3%
Sinnice extremely cindery loamy sand, overblown, 30 to 65% slopes	2.1%
Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90% slopes	1.4%
Sinnice extremely cindery loamy sand, overblown, cold, 30 to 65% slopes	1.2%
Elkprairie loamy sand, 5 to 30% slopes	4.0%
Lithic Orthents, Andepts, Cryands, Udands	2.7%
Pelee extremely cindery loamy sand, overblown, 65 to 90% slopes	1.0%
Aquolls, Fibrists, Aquods; Bandid cindery sandy loam, 5 to 30% slopes; Bandid cindery sandy loam, 65 to 90% slopes; Hatchet, cold-Rock outcrop complex, 65 to 90% slopes; Hatchet, overblown-Rock outcrop complex, 65 to 90% slopes; Hatchet, overblown, cold-Rock outcrop complex, 65 to 90% slopes; Histic Cryaquepts, 0 to 5% slopes; Minniepeak extremely cindery loamy sand, overblown, 30 to 65% slopes; Minniepeak extremely cindery loamy sand, overblown, 65 to 90% slopes; N/A; Pelee extremely cindery loamy sand, overblown, 30 to 65% slopes; Pelee overblown-Rock outcrop complex, 65 to 90% slopes; Pelee sandy loam, 30 to 65% slopes; Pelee sandy loam, 5 to 30% slopes; Pelee sandy loam, 65 to 90% slopes; Sinnice extremely cindery loamy sand, 30 to 65% slopes; Sinnice extremely cindery loamy sand, 5 to 30% slopes; Sinnice extremely cindery loamy sand, 65 to 90% slopes; Sinnice extremely cindery loamy sand, cold, 5 to 30%	Less than 1% each

Type	Percent
slopes; Sinnice extremely cindery loamy sand, cold, 65 to 90% slopes; Sinnice extremely cindery loamy sand, overblown, cold, 5 to 30% slopes; Sinnice, overblown, cold-Rock outcrop complex, 65 to 90% slopes; Vanson extremely cindery loamy sand, overblown, 65 to 90% slopes; Vanson, cold-Rock outcrop complex, 65 to 90% slopes; Vanson, overblown, cold-Rock outcrop complex, 65 to 90%slopes; Wakepish very gravelly sandy loam, 0 to 30% slopes; Water	

Vegetated cover within the subwatershed is composed of 54.42 percent recently disturbed or modified land, 43.28 percent forested woodland, 1.96 percent developed other human use, and less than 1 percent of each of the following: agriculture, nonvascular or sparse vascular rock vegetation, open water, and 0.22 percent shrubland and/or grassland.

4.2.13.4 Biological Resources

The PHS priority habitat types within the subwatershed are freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, riverine wetland, and elk habitat. The PHS species within the subwatershed include northern spotted owl, northern goshawk, western toad, lynx, Van Dyke's salamander, and Cascade torrent salamander. The monitored non-PHS species within the subwatershed include coastal tailed frog, osprey, and Cascade frog.

Approximately 7.49 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. In freshwater, the Lewis coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a).

A total of 83.91 acres of NWI wetlands were identified within the subwatershed. These wetlands include 57.64 percent riverine wetland, 27.43 percent freshwater pond, 8.65 percent freshwater forested/shrub wetland, and 6.27 percent freshwater emergent wetland.

4.2.13.5 Land Use and Altered Conditions

The only existing land use within this subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 144.52 miles of roads and a road density of 3.65 miles per square mile. The subwatershed has approximately 5,023 square feet of impervious surface from structures and 24,636,782 square feet of impervious road surfaces for a total of 24,641,805 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include 23 archaeological sites.

The subwatershed has one wellhead protection area. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d)

listings associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Clearwater Creek Reach #1
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.65 miles of roads within the reach's shoreline jurisdiction with approximately 4,835.08 square feet of impervious road surfaces. This reach has a 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Clearwater Creek #2
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.22 miles of roads within the reach's shoreline jurisdiction with approximately 36,052.87 square feet of impervious road surfaces. This reach has a 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Bean Creek
The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no designated roads or impervious surface for this reach. No additional altered conditions are known to be present within this reach.

4.2.13.6 Public Access
The subwatershed has 12.79 miles of trails. There are no boat ramps, golf courses, or parks. Clearwater Creek Reach #1 is relatively inaccessible by roads. Clearwater Creek Reach #2 is accessible by NF-2568. Bean Creek is relatively inaccessible with the exception of its northern portion by NF-9103.

4.2.13.7 Restoration Opportunities
Channel widening from intense timber harvest, as well as the 1980 mudflows and loss of riparian vegetation from the eruption of Mount Saint Helens, have affected water quality and stream temperatures in the Muddy River subbasin (Washington State Conservation Commission 2000b). Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Some potential restoration actions within the subbasin and subwatershed include managing forest practices and development activities to minimize impacts from sediment supply processes, runoff regime, and water supply in order to improve turbidity, embedded substrates, water quality, and stream flow.

4.2.14 Upper Clear Creek (170800020203) – Map Sheet 1

4.2.14.1 Overview

The Upper Clear Creek (170800020203) HUC is approximately 18,055.51 total acres, and includes 87.18 acres of shoreline jurisdictional area and 0.52 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's approximate downstream location is 46.2056/-121.9552. This subwatershed is located within the Muddy River subbasin in the northwestern quadrant of Skamania County and east of the Mount Saint Helens National Volcanic Monument. The subwatershed is located on U.S. Forest Service land.

4.2.14.2 Reaches

Wright Creek: From its headwaters to the Upper Clear Creek HUC/Lower Clear Creek HUC boundary. Its downstream location is 46.2056/-121.9552, and its upstream location is 46.2996/-121.9521. This reach is not a shoreline of statewide significance.

Wright Meadow: Located in the southeastern portion of the Upper Clear Creek HUC. The center of this waterbody is at 46.2160/-121.9209. This reach is not a shoreline of statewide significance.

4.2.14.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-34. The subwatershed also includes approximately 66.37 acres of landslide hazard zones.

Table 4-34. Surficial Geology and Soil Types - Upper Clear Creek (170800020203)

Type	Percent
Surficial Geology	
Andesite Flows	88.06%
Tuffs and Tuff Breccias	9.16%
Basaltic Andesite Flows	1.8%
Basalt Flows Intrusive Rocks, Undivided Alluvium	Less than 1% each
Soil Types	
Vitric Haplocryands (CIND/MED)	57.2%
Typic Udivitrands (PUM, M, FRG)	26.4%
Lithic Orthents, Andepts, Cryands, Udands	9.0%
Typic Vitricryands (PUM) TYPIC	3.2%
Typic Vitricryands (PUM, M)	2.3%
Aquolls, Fibrists, Aquods; Aquic Vitricryands (ASHY/MED-SK); Typic Udivitrands (PUM/S-SK, FRG); Non-Applicable Soils; Typic Udivitrands (CIND/MED, FRG)	Less than 1% each

Vegetated cover within the subwatershed is composed of 69.04 percent forested woodland, 29.40 percent recently disturbed or modified land, 1.17 percent developed other human use, and less than one percent of each of the following: shrubland and/or grassland, and nonvascular or sparse vascular rock vegetation.

4.2.14.4 Biological Resources

The PHS priority habitat types within the subwatershed are freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, "other" type of wetland, and elk habitat. The PHS species within the subwatershed include northern spotted owl, northern goshawk, western toad, marten, and Cascade torrent salamander. The monitored non-PHS species within the subwatershed include coastal tailed frog, Cascades frog, and Cope's giant salamander. No stream miles of federally or state listed fish habitat are designated within the subwatershed.

A total of 74.79 acres of NWI wetlands were identified within the subwatershed. These wetlands include 60.37 percent freshwater emergent wetland, 35.80 percent freshwater forested/shrub wetland, 3.43 percent freshwater pond, and 0.4 percent other.

4.2.14.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services. All of the reach is publicly owned and it is entirely unzoned. The subwatershed has approximately 59.83 miles of roads with a road density of 2.12 miles per square mile. The subwatershed has approximately 9,712,542 square feet of impervious road surfaces. There are no known archaeological, cultural, or historical resources within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Wright Creek

This reach has 0.52 total stream miles under shoreline jurisdiction and 25.93 acres of shoreline jurisdictional area. The only existing land use within this reach is government servicesAll of the reach is publicly owned and it is entirely unzoned. There are no roads or impervious surfaces designated within this reach. No additional altered conditions are known to be present within this reach.

Wright Meadow

This reach has a total of 30.01 acres and 61.25 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no roads or impervious surfaces designated within this reach. No additional altered conditions are known to be present within this reach.

4.2.14.6 Public Access

The subwatershed has 18.53 miles of trails. There are no boat ramps, golf courses, or parks. Wright Creek and Wright Meadows are relatively inaccessible by roads.

4.2.14.7 Restoration Opportunities

The Upper Clear Creek HUC is located within the Muddy River subbasin. Channel widening from intense timber harvest, as well as the 1980 mudflows and loss of riparian vegetation from the eruption of Mount Saint Helens, have affected water quality and stream temperatures in the Muddy River subbasin (Washington State Conservation Commission 2000b). Ecological conditions within this subwatershed are generally in good condition, but some potential restoration actions within the subbasin and subwatershed include managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply in order to improve turbidity, embedded substrates, water quality, and stream flow.

4.2.15 Lower Clear Creek (170800020204) – Map Sheets 1, 3, and 3b

4.2.15.1 Overview

The Lower Clear Creek (170800020204) HUC is approximately 12,275.73 total acres in size, and includes 394.82 acres of shoreline jurisdictional area and 8.26 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.1133/-122.0050, and its upstream location is 46.2056/-121.9552. This subwatershed is located within the Muddy River subbasin in the northwestern quadrant of Skamania County and east of the Mount Saint Helens National Volcanic Monument. The subwatershed is located on U.S. Forest Service land.

4.2.15.2 Reaches

The Clear Creek reach is the only reach within the subwatershed. Its downstream location is 46.1133/-122.0050, and its upstream location is 46.2056/-121.9552. This reach is not a shoreline of statewide significance.

4.2.15.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-35.

Table 4-35. Surficial Geology and Soil Types - Lower Clear Creek (170800020204)

Type	Percent
Surficial Geology	
Andesite Flows	62.72%
Tuffs and Tuff Breccias	31.69%
Alluvium	2.96%
Basalt flows	2.56%
Lahars; Volcaniclastic Deposits or Rocks	Less than 1% each
Soil Types	
Vitric Haplocryands (CIND/MED)	58.7%
Typic Udivitrands (PUM, M, FRG)	21.5%
Typic Udivitrands (PUM/S-SK, FRG)	5.9%
Typic Udivitrands (CIND/MED, FRG)	5.7%

Type	Percent
Lithic Orthents, Andepts, Cryands, Udands	2.3%
Bannel cindery sandy loam, 30 to 65% slopes	1.3%
Bannel cindery sandy loam, 5 to 30% slopes	1.3%
Yalelake sandy loam, 30 to 65% slopes	1.2%
Aquolls, Fibrists, Aquods; Non-applicable soils; Pinchot cindery sandy loam, 0 to 30% slopes; Water; Yalelake sandy loam, 2 to 30% slopes; Yalelake sandy loam, 65 to 90% slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 76.23 percent forested woodland, 23.42 percent recently disturbed or modified land, and less than one percent of each of the following: developed other human use, nonvascular or sparse vascular rock vegetation, open water, and shrubland and/or grassland.

4.2.15.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, riverine wetland, elk habitat, and cliffs/bluffs. The PHS species within the subwatershed include northern spotted owl, peregrine falcon, cascade torrent salamander, and grizzly bear.

Approximately 6.55 stream miles of Lewis coastal cutthroat are found within the subwatershed. In freshwater habitat, coastal cutthroat prefers deep pools and cover that can be provided by large woody debris (U.S. Fish and Wildlife Service 2011b).

A total of 55.24 acres of NWI wetlands were identified within the subwatershed. These wetlands include 48.92 percent riverine wetland, 47.61 percent freshwater forested/shrub wetland, and 2.47 percent freshwater emergent wetland.

4.2.15.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services. All of the subwatershed is publicly owned. In terms of zoning, the subwatershed is 97.6 percent unzoned and 2.4 percent residential – lower density. The subwatershed has approximately 30.74 miles of roads with a road density of 1.60 miles per square mile. The subwatershed has approximately 5,091,787 square feet of impervious road surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include seven archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within this subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the five 303(d) listing associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Clear Creek

This reach has 8.26 total stream miles under shoreline jurisdiction and 394.82 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned. In terms of zoning, the reach is 89.8 percent unzoned and 10.2 percent residential – lower density.

There are approximately 0.17 miles of roads within the reach. It has approximately 33,053.82 square feet of impervious road surfaces. This reach has a State 303d listing for temperature. No additional altered conditions are known to be present within this reach.

4.2.15.6 Public Access

The subwatershed has 4.46 miles of trails. There are no boat ramps, golf courses, or parks designated within the subwatershed. The subwatershed is mostly inaccessible by roads.

4.2.15.7 Restoration Opportunities

The Upper Clear Creek HUC is located within the Muddy River subbasin. Channel widening from intense timber harvest, as well as the 1980 mudflows and loss of riparian vegetation from the eruption of Mount Saint Helens, have affected water quality and stream temperatures in the Muddy River subbasin (Washington State Conservation Commission 2000b). Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Some potential restoration actions within the subbasin and subwatershed include managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply in order improve excessive fine sediment and turbidity, embedded substrates, water quality, and stream flow.

4.2.16 Lower Muddy River (170800020205) – Map Sheets 1 and 3b

4.2.16.1 Overview

The Lower Muddy River (170800020205) HUC is approximately 12,438.70 total acres, and includes 648.11 acres of shoreline jurisdictional area and 10.76 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is approximately 46.1133/-122.0050. This subwatershed is located within the Muddy River subbasin in the northwestern quadrant of Skamania County and east and southeast of the Mount Saint Helens National Volcanic Monument. The subwatershed is mostly located on U.S. Forest land.

Muddy River (Skamania County 2015a)

4.2.16.2 Reaches

Muddy River Reach #2: From the Lower Muddy River HUC/Upper Muddy River HUC boundary to its confluence with Muddy River Reach #3. Its downstream location is 46.1667/-122.0321, and its upstream location is 46.1832/-122.0540. This reach is not a shoreline of statewide significance.

Muddy River Reach #3: From its confluence with Muddy River UT and Muddy River Reach #4 to its confluence with Muddy River #2. Its downstream location is 46.1471/122.0289, and its upstream location is 46.1667/-122.0321. This reach is not a shoreline of statewide significance.

Muddy River UT: From its headwaters to its confluence with Muddy River Reach #3 and Muddy River Reach #4. Its downstream location is 46.1471/-122.02889, and its upstream location is 46.1483/-122.0307. This reach is not a shoreline of statewide significance.

Muddy River Reach #4: From its confluence with Muddy River Reach #5 to its confluence with Muddy River UT. Its downstream location is 46.1133/-122.0050, and its upstream location is 46.1471/-122.02889. This reach is not a shoreline of statewide significance.

Muddy River Reach #5: From the Lower Muddy River HUC/Upper Swift Reservoir HUC boundary to its confluence with Muddy River Reach #4 at the Lower Muddy River HUC/Lower Clear Creek HUC boundary. Its downstream location is 46.0697/-122.0062, and its upstream location is 46.1133/-122.0050. This reach is not a shoreline of statewide significance.

Cedar Flats: Located in the southern portion of the Lower Muddy River HUC and west of Muddy River. The center of this waterbody is at 46.1054/-122.0176. This reach is not a shoreline of statewide significance.

4.2.16.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-36.

Table 4-36. Surficial Geology and Soil Types - Lower Muddy River (170800020205)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	64.5%
Tuffs and Tuff Breccias	21.84%
Lahars	9.21%
Andesite Flows	3.69%
Alluvium	0.76%
Soil Types	
Bannel cindery sandy loam, 30 to 65% slopes	19.2%
Vitric Haplocryands (CIND/MED)	9.4%
Bannel cindery sandy loam, 5 to 30% slopes	8.9%
Typic Udivitrands (CIND/MED, FRG)	8.5%
Yalelake sandy loam, 2 to 30% slopes	7.5%
Bannel cindery sandy loam, 65 to 90% slopes	6.9%
Pinchot cindery sandy loam, 0 to 30% slopes	4.6%
Pinoty sandy loam, 0 to 30% slopes	4.0%
Typic Udivitrands (PUM, M, FRG)	3.7%
Cinnamon sandy loam, 30 to 65% slopes	2.9%
Lonestar cindery sandy loam, 5 to 30% slopes	2.8%
Cinnamon sandy loam, 2 to 30% slopes	2.6%
Swift-Rock outcrop complex, 65 to 90% slopes	2.6%
Riverwash	2.2%
Pinchot cindery sandy loam, 50 to 90% slopes	2.0%
Lonestar cindery sandy loam, 30 to 65% slopes	1.9%
Yalelake sandy loam, 30 to 65% slopes	1.9%
Swift cindery sandy loam, 65 to 90% slopes	1.8%
Wakepish very gravelly sandy loam, 0 to 30%slopes	1.1%
Aquolls, Fibrists, Aquods; Bandid cindery sandy loam, 5 to 30% slopes; Bandid cindery sandy loam, 65 to 90% slopes; Bonneville stony sandy loam; Haplumbrepts, 0 to 3% slopes; N/A; Obscurity very bouldery sand, 0 to 30% slopes; Pits; St. Helens sandy loam, 0 to 30% slopes; Typic Udivitrands	Less than 1% each

Type	Percent
(PUM/S-SK, FRG); Water; Yalelake sandy loam, 65 to 90% slopes	

Vegetated cover within the subwatershed is composed of 64.73 percent forested woodland, 32.02 percent recently disturbed or modified land, 1.40 percent open water 1.38 percent nonvascular or sparse vascular rock vegetation, and less than 1 percent of each of the following: percent agriculture, percent developed other human use, and shrubland and/or grassland. The subwatershed also includes a total of 49.82 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.2.16.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, riverine wetland, elk habitat, and harlequin duck habitat. There are no PHS species within the subwatershed. The monitored non-PHS species within the subwatershed include coastal tailed frog and osprey.

Approximately 9.17 stream miles of Lewis coastal cutthroat habitat and 1.63 stream miles of Lewis bull trout habitat are found within the subwatershed. In freshwater, the coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a). Bull trout have many different life histories that can vary by individual population, which may include: remaining in small streams their entire life; migrating between small streams and larger rivers; or migrating into lakes or reservoirs and then back to streams or rivers for spawning (Washington Department of Fish and Wildlife 2015b).

A total of 194.41 acres of NWI wetlands were identified within the subwatershed. These wetlands include 84.59 percent riverine wetland and 15.41 percent freshwater forested/shrub wetland.

4.2.16.5 Land Use and Altered Conditions

The existing land uses within the subwatershed includes 89.9 percent government services, 6.1 percent mining and extraction establishments, 3.8 percent agriculture, forestry, fishing, and hunting, and less than 1 percent of each of the following: residence or accommodation functions and undefined. Approximately 89.9 percent of the subwatershed is publicly owned and 10.1 percent is privately owned. In terms of zoning, the watershed is approximately 66.6 percent unzoned, 23.7 percent residential – lower density, and 9.7 percent forest.

The subwatershed has approximately 76.98 miles of roads with a road density of 3.96 miles per square mile. The subwatershed has approximately 897 square feet of impervious surface for structures and 12,567,192 square feet of impervious road surfaces for a total of 12,568,089 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include seven archaeological sites.

The subwatershed has four wellhead protection areas. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Muddy River Reach #2
This reach has 1.63 total stream miles under shoreline jurisdiction and 96.14 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.01 miles of roads within the reach's shoreline jurisdiction. It has approximately 1,118 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Muddy River Reach #3
This reach has 1.49 total stream miles under shoreline jurisdiction and 70.42 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.06 miles of roads within the reach's shoreline jurisdiction resulting in approximately 9,498.18 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Muddy River #UT
This reach has 0.12 total stream miles under shoreline jurisdiction and 6.55 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no roads or impervious surfaces within the reach. No additional altered conditions are known to be present within this reach.

Muddy River Reach #4
This reach has 2.93 total stream miles under shoreline jurisdiction and 156.31 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned. In terms of zoning, the reach is 49.3 percent unzoned and 49.3 percent residential – lower density. There are approximately 0.10 miles of roads within the reach's shoreline jurisdiction resulting in approximately 20,741 square feet of impervious surfaces. This reach has a State 303d listing for temperature. No additional altered conditions are known to be present within this reach.

Muddy River Reach #5

This reach has 4.58 total stream miles under shoreline jurisdiction and 256.94 acres of shoreline jurisdictional area. The existing land uses within this reach are 72.7 percent government services, 21.6 percent mining and extraction establishments, 3.3 percent agriculture, forestry, fishing, and hunting, 2.2 percent residence or accommodation functions, and less than one percent undefined. Approximately 72.8 percent of the reach is publicly owned and 27.2 percent is privately owned. In terms of zoning, the reach is 78.4 percent residential – lower density and 21.6 percent forest. There are approximately 0.002 miles of roads within the reach's shoreline jurisdiction resulting in approximately 1,662.11 square feet of impervious surfaces. This reach has a State 303d listing for temperature. No additional altered conditions are known to be present within this reach.

Cedar Flats

This waterbody is 31.82 acres in size and includes 61.75 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely zoned as residential – lower density. There are no miles of roads or impervious surfaces within the reach. No additional altered conditions are known to be present within this reach.

4.2.16.6 Public Access

The subwatershed has 2.33 miles of trails. There are no boat ramps, golf courses, or parks within the subwatershed. Portions of Muddy River Reach #2, Muddy River Reach #3, Muddy River UT, and Muddy River Reach #4 are accessible from NF-700. Portions of Muddy River Reach #5 are accessible by NF-25, and Cedar Flats is relatively accessible by NF-25.

4.2.16.7 Restoration Opportunities

Channel widening from intense timber harvest, as well as the 1980 mudflows and loss of riparian vegetation from the eruption of Mount Saint Helens, have affected water quality and stream temperatures in the Muddy River subbasin (Washington State Conservation Commission 2000b). Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Some potential restoration actions within the subbasin and subwatershed include managing forest practice and development activities to minimize impacts to sediment supply processes, runoff regime, and water supply in order to improve turbidity, embedded substrates, water quality, and stream flow.

4.2.17 Pine Creek (170800020301) – Map Sheets 1 and 3b

4.2.17.1 Overview

The Pine Creek (170800020301) HUC is approximately 15,327.09 total acres, and includes 631.90 acres of shoreline jurisdictional area and 13.29 miles of streams under shoreline jurisdiction. The 13.29 miles includes four reaches of Pine Creek and

three unnamed tributaries. Using the WGS 84, the subwatershed's downstream location is 46.0721/-122.0170. This subwatershed is located within the Upper Lewis River watershed in the northwestern quadrant of Skamania County. Mount Saint Helens National Volcanic Monument is located to the northwest of the subwatershed.

Pine Creek (Skamania County 2015a)

4.2.17.2 Reaches

Pine Creek Reach #1: From its headwaters to its confluence with Pine Creek #2 and Pine Creek UT #3. Its downstream location is 46.1197/-122.0776 and its upstream location is 46.1361/-122.0946. This reach is not a shoreline of statewide significance.

Pine Creek Reach #2: From its confluence with Pine Creek UT #2 and Pine Creek #3 to its confluence with Pine Creek #1 and Pine Creek UT #3. Its downstream location is 46.1036/-122.0634 and its upstream location is 46.1197/-122.0776. This reach is not a shoreline of statewide significance.

Pine Creek Reach #3: From its confluence with Pine Creek UT #1 and Pine Creek #4 to its confluence with Pine Creek UT #2 and Pine Creek #2. Its downstream location is 46.0933/-122.0601 and its upstream location is 46.1036/-122.0634. This reach is not a shoreline of statewide significance.

Pine Creek Reach #4: From the Pine Creek HUC/Upper Swift Reservoir HUC boundary to its confluence with Pine Creek UT #1 and Pine Creek #3. Its downstream location is 46.0720/-122.0170 and its upstream location is 46.0933/-122.0601. This reach is not a shoreline of statewide significance.

Pine Creek UT #1: From its headwaters to its confluence with Pine Creek Reach #3 and Pine Creek #4. Its downstream location is 46.0933/-122.0601 and its upstream location is 46.1033/-122.0790. This reach is not a shoreline of statewide significance.

Pine Creek UT #2: From its headwaters to its confluence with Pine Creek Reach #2 and Pine Creek Reach #3. Its downstream location is 46.1036/-122.0634 and its upstream location is 46.1279/-122.0702. This reach is not a shoreline of statewide significance.

Pine Creek UT #3: From its headwaters to its confluence with Pine Creek Reach #1 and Pine Creek Reach #2. Its downstream location is 46.1197/-122.0776 and its upstream location is 46.1379/-122.1105. This reach is not a shoreline of statewide significance.

4.2.17.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-37.

Table 4-37. Surficial Geology and Soil Types - Pine Creek (170800020301)

Type	Percent
Surficial Geology	
volcaniclastic deposits or rocks	58.15%
andesite flows	19.65%
basalt flows	15.6%
lahars	6.31%
Ice; volcanic rocks; water	Less than 1% each
Soil Types	
Cinnamon sandy loam, 30 to 65% slopes	14.3%
St. Helens sandy loam, 0 to 30% slopes	14.2%
Cinnamon sandy loam, 2 to 30% slopes	8.7%
Shoestring fine sandy loam, 0 to 30% slopes	7.5%
Rock outcrop-Rubbleland complex	6.9%
Pelee sandy loam, 30 to 65% slopes	6.4%
Bannel cindery sandy loam, 65 to 90% slopes	4.5%
Obscurity very bouldery sand, 0 to 30% slopes	3.7%
Polepatch extremely bouldery loamy sand, 0 to 30% slopes	3.4%
Forsyth cindery loamy sand, 65 to 120% slopes	3.2%
Pinchot cindery sandy loam, 0 to 30% slopes	2.9%
Pelee sandy loam, 5 to 30% slopes	2.8%
Bannel cindery sandy loam, 30 to 65% slopes	2.3%
Badland	2.1%

Type	Percent
Bannel cindery sandy loam, 5 to 30% slopes	2.1%
Yalelake sandy loam, 2 to 30% slopes	2.1%
Lithic Umbric Vitrandepts, 0 to 15% slopes	1.5%
Bandid cindery sandy loam, 30 to 65% slopes	1.2%
Fortran cindery loamy sand, 65 to 120% slopes	1.2%
Polepatch extremely bouldery loamy sand, cold, 0 to 30% slopes	1.0%
Histic Cryaquepts, 0 to 5% slopes; Lonestar cindery sandy loam, 30 to 65% slopes; Lonestar cindery sandy loam, 5 to 30% slopes; Lonestar cindery sandy loam, 65 to 90% slopes; Mountzion clay loam, 2 to 15% slopes; Pelee sandy loam, 65 to 90% slopes; Pinchot cindery sandy loam, 50 to 90% slopes; Pinoty sandy loam, 0 to 30% slopes; Pits; Riverwash; Swift cindery sandy loam, 2 to 30% slopes; Swift cindery sandy loam, 65 to 90% slopes; Vanson-Rock outcrop complex, 30 to 65% slopes; Vanson-Rock outcrop complex, 65 to 90% slopes; Vanson sandy loam, 30 to 65% slopes; Wakepish very gravelly sandy loam, 0 to 30% slopes; Water; Yalelake sandy loam, 30 to 65% slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 67.47 percent forested woodland, 24.84 percent recently disturbed or modified land, 6.96 percent nonvascular or sparse vascular rock vegetation, and less than one percent of each of the following: developed other human use, high montane vegetation, and shrubland and/or grassland. The subwatershed also includes a total of 1.12 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.2.17.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, "other" type of wetland, riverine wetland, elk habitat, and mule and black-tailed deer habitat. The PHS species within the subwatershed includes northern spotted owl.

Approximately 12.34 stream miles of Lewis coastal cutthroat habitat and 8.41 stream miles of Lewis bull trout habitat. In freshwater, the coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a). Bull trout have many different life histories that can vary by individual population, which may include: remaining in small streams their entire life; migrating between small streams and larger rivers; or migrating into lakes or reservoirs and then back to streams or rivers for spawning (Washington Department of Fish and Wildlife 2015b).

A total of 85.50 acres of NWI wetlands were identified within the subwatershed. These wetlands include 45.14 percent of freshwater forested/shrub wetland, 29.50 percent freshwater emergent wetland, 21.20 percent riverine wetland, 3.89 percent freshwater pond, and less than one percent of other types of wetland.

4.2.17.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 48.6 percent mining and extraction establishments, 45.6 percent government services, 5.3 percent agriculture, forestry, fishing, and hunting, and less than one percent of residence or accommodation functions, and undefined land uses. Approximately 54.3 percent of the subwatershed is privately owned and 45.7 percent is publicly owned. In terms of zoning, the watershed is 53.2 percent forest, 42.8 percent unzoned, and 4.1 percent residential – lower density.

The subwatershed has approximately 118.44 miles of roads with a road density of 4.95 miles per square mile. The subwatershed has approximately 61,158 square feet of impervious surface for structures and 18,960,084 square feet of impervious road surfaces for a total of 19,021,242 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include one historic register point.

The subwatershed has four wellhead protection areas. No State 303d water quality issues have been identified within this subwatershed.

Pine Creek Reach #1

This reach has 1.85 total stream miles under shoreline jurisdiction and 88.30 acres of shoreline jurisdictional area. The existing land uses within this reach are 63.7 percent mining and extraction establishments and 36.3 percent government services. Approximately 63.7 percent of the reach is privately owned and 36.3 percent is publicly owned. In terms of zoning, the reach is 63.7 percent forest and 26.3 percent unzoned. There are approximately 0.07 miles of roads within the reach's shoreline jurisdiction resulting in approximately 9,646.16 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Pine Creek Reach #2

This reach has 1.62 total stream miles under shoreline jurisdiction and 75.21 acres of shoreline jurisdictional area. The only existing land use within this reach is mining and extraction establishments. All of the reach is privately owned and is zoned entirely as forest. There are approximately 0.31 miles of roads within the reach's shoreline jurisdiction resulting in approximately 50,379.72 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Pine Creek Reach #3

This reach has 0.76 total stream miles under shoreline jurisdiction and 35.68 acres of shoreline jurisdictional area. The only existing land use within this reach is mining and extraction establishments. All of the reach is privately owned and is zoned as forest. There are approximately 0.002 miles of roads within the reach's shoreline

jurisdiction resulting in approximately 291.96 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Pine Creek Reach #4

This reach has 3.20 total stream miles under shoreline jurisdiction and 153.57 acres of shoreline jurisdictional area. The existing land uses within this reach are 37.3 percent mining and extraction establishments, 33.1 percent government services, 24.2 percent agriculture, forestry, fishing, and hunting, 3.6 percent residence or accommodation functions, and 1.8 percent undefined land uses. Approximately 65.1 percent of the reach is privately owned and 34.9 percent is publicly owned. In terms of zoning, the reach is 62.7 percent residential – lower density and 37.3 percent forest.

There are approximately 0.21 miles of roads within the reach's shoreline jurisdiction. It has approximately 2,499.11 square feet of impervious surface for structures and 41,520.16 square feet of impervious road surfaces for a total of 44,019.27 square feet of impervious surfaces. Wellhead protection areas are located within this reach. No additional altered conditions are known to be present within this reach.

Pine Creek UT #1

This reach has 1.51 total stream miles under shoreline jurisdiction and 71.27 acres of shoreline jurisdictional area. The only existing land use within this reach is mining and extraction establishments. All of the reach is privately owned and is entirely zoned as forest. There are approximately 0.29 miles of roads within the reach's shoreline jurisdiction resulting in approximately 46,679.02 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Pine Creek UT #2

This reach has 1.86 total stream miles under shoreline jurisdiction and 89.85 acres of shoreline jurisdictional area. The only existing land use within this reach is mining and extraction establishments. All of the reach is privately owned and zoned as forest. There are approximately 0.16 miles of roads within the reach's shoreline jurisdiction resulting in approximately 25,798.89 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Pine Creek UT #3

This reach has 2.48 total stream miles under shoreline jurisdiction and 118.03 acres of shoreline jurisdictional area. The existing land uses within this reach are 58.8 percent mining and extraction establishments and 41.2 percent government services. Approximately 58.8 percent of the reach is privately owned and 41.2 percent is publicly owned. In terms of zoning, the reach is 58.8 percent forest and 41.2 percent unzoned. There are approximately 1.31 miles of roads within the reach's shoreline jurisdiction resulting in approximately 206,265.94 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

4.2.17.6 Public Access

The subwatershed has 6.09 miles of trails and is accessible from a large number of forest service roads and Highway 90.

4.2.17.7 Restoration Opportunities

The Pine Creek HUC is located within the Upper Lewis River subbasin. Ecological conditions within this subwatershed are generally in good condition, but it has several potential restoration opportunities including: increasing and/or enhancing rearing and spawning habitat; reducing fine sediment inputs; reducing water temperatures; increasing amounts of large woody debris; continuing the PacifiCorp Energy, Washington Department of Fish and Wildlife, and U.S. Fish and Wildlife fish monitoring programs; reducing bull trout entrainment at the Swift Dam; and designating conservation easements for increased protection of adjacent riparian zones and aquatic habitat (Washington State Conservation Commission 2000b; Haspiel 2015; Federal Energy Regulatory Commission 2003). Additionally, managing forest practice and development activities to minimize impacts to sediment supply processes, runoff regime, and water supply can improve turbidity, embedded substrates, water quality and stream flow.

4.2.18 Upper Swift Reservoir (170800020302) – Map Sheets 3b and 3d

4.2.18.1 Overview

The Upper Swift Reservoir (170800020302) HUC is approximately 10,811.95 total acres in size, and includes 1,461.54 acres of shoreline jurisdictional area and 2.66 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's approximate downstream location is 46.0490/-122.0800, and its upstream location is 46.0281/-122.0062. This subwatershed is located within the Upper Lewis River watershed in the west-central portion of Skamania County, and includes the eastern portion of Swift Reservoir. Mount Saint Helens National Volcanic Monument is located further to the northwest of the subwatershed.

Lewis River (Skamania County 2015a)

4.2.18.2 Reaches

Swift Reservoir UT: From its headwaters to its confluence with Swift Reservoir #1 and Swift Reservoir #2. Its downstream location is 46.0421/-122.0392 and its upstream location is 46.0281/-122.0181. This reach not a shoreline of statewide significance.

Lewis River #18: From the eastern boundary of the Upper Swift Reservoir HUC to its confluence with Lewis River #19 and the Upper Swift Reservoir HUC/Pine Creek HUC boundary. Its downstream location is 46.0721/-122.0170 and its upstream location is 46.0697/-122.0062. This reach is a shoreline of statewide significance.

Lewis River #19: From the Upper Swift Reservoir HUC/Pine Creek HUC boundary and its confluence with Lewis River #18 to its confluence with Swift Reservoir #1 and Swift Reservoir #2. Its downstream location is 46.0656/-122.0198 and its upstream location is 46.0721/-122.0170. This reach is a shoreline of statewide significance.

Swift Reservoir #1: This reach is located along the southeastern portion of Swift Reservoir between Lewis River #19 and Swift Reservoir UT. The center of this section of the waterbody is at approximately 46.0507/-122.0305. This reach is a shoreline of statewide significance.

Swift Reservoir #2: This reach is located along the northern portion of Swift Reservoir within the Upper Swift Reservoir HUC. The center of this section of the waterbody is at approximately 46.0512/-122.0657. This reach is a shoreline of statewide significance.

Swift Reservoir #3: This reach is located along the southern portion of Swift Reservoir between Lewis River UT and the western boundary of the Upper Swift Reservoir HUC. The center of this section of the waterbody is at approximately 46.0462/-122.0634. This reach is a shoreline of statewide significance.

4.2.18.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-38. The subwatershed also includes approximately 180.9 acres of landslide hazard zones.

Table 4-38. Surficial Geology and Soil Types - Upper Swift Reservoir (170800020302)

Type	Percent
Surficial Geology	
Andesite Flows	37.84%
Tuffs and Tuff Breccias	30.88%
Volcaniclastic Deposits or Rocks	16.52%
Water	10.6%
Mass-wasting Deposits, mostly Landslides	1.67%
Basalt Flows	1.57%
Lahars, Diorite, Alluvium	Less than 1% each
Soil Types	
Swift cindery sandy loam, 30 to 65% slopes	19.7%
Cinnamon sandy loam, 2 to 30% slopes	14.5%
Swift-Rock outcrop complex, 65 to 90% slopes	11.1%
Water	10.2%
Cinnamon sandy loam, 30 to 65% slopes	9.6%
Vitric Haplocryands (CIND/MED)	8.4%
Yalelake sandy loam, 2 to 30% slopes	4.4%
Vanson sandy loam, 5 to 30% slopes	3.6%
Pinchot cindery sandy loam, 0 to 30% slopes	3.2%
Yalelake sandy loam, 30 to 65% slopes	2.4%
Swift cindery sandy loam, 65 to 90% slopes	1.8%
Typic Udivitrands (PUM, M, FRG)	1.8%
Bonneville stony sandy loam	1.7%
Cinnamon sandy loam, 65 to 90% slopes	1.4%
Swift cindery sandy loam, 2 to 30% slopes	1.2%
Haplumbrepts, 0 to 3% slopes; Histic Cryaquepts, 0 to 5% slopes; Lithic Orthents, Andepts, Cryands, Udands; Pinchot cindery sandy loam, 50 to 90% slopes; Pinoty sandy loam, 0 to 30% slopes; Rock outcrop-Rubbleland complex; Swift-Rock outcrop complex, 30 to 65% slopes; Typic Udivitrands (CIND/MED, FRG); Typic Udivtrands (PUM/S-SK, FRG); Typic Vitricryands (ASHY/MED-SK); Vanson sandy loam, 30 to 65%	Less than 1% each

Type	Percent
slopes; Vanson sandy loam, 65 to 90% slopes; Yalelake sandy loam, 65 to 90% slopes	

Vegetated cover within the subwatershed is composed of 56.36 percent recently disturbed or modified land, 33.24 percent forested woodland, 7.16 percent open water, 2.56 percent nonvascular or sparse vascular rock vegetation, 0.67 percent developed other human use, and 0.02 percent shrubland and/or grassland. The subwatershed also includes a total of 1,214.62 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.2.18.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, lake, riverine wetland, "other" type of wetland, elk habitat, bald eagle habitat, cliffs/bluffs, and habitat for mule and black-tailed deer. The PHS species within the subwatershed include northern spotted owl, bald eagle, and peregrine falcon. The monitored non-PHS species within the subwatershed is osprey.

Approximately 8.93 stream miles of Lewis coastal cutthroat habitat and 5.13 stream miles of Lewis bull trout habitat is found within the subwatershed. In freshwater, the coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a). Bull trout have many different life histories that can vary by individual population, which may include: remaining in small streams their entire life; migrating between small streams and larger rivers; or migrating into lakes or reservoirs and then back to streams or rivers for spawning (Washington Department of Fish and Wildlife 2015b).

A total of 1,176.66 acres of NWI wetlands were identified within the subwatershed. These wetlands include 95.21 percent lake, 3.45 percent freshwater forested/shrub wetland, 1.73 percent riverine wetland, 0.60 percent freshwater emergent wetland, and 0.01 other wetland.

4.2.18.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 69.1 percent mining and extraction establishments, 19.3 percent government services, 7.7 percent transportation, communication, information, and utilities, 2.2 percent agriculture, forestry, fishing, and hunting, 1.3 percent undefined land use, and less than one percent of each of the following: residence or accommodation functions, and construction-related business. Approximately 79.4 percent of the subwatershed is privately owned and 20.6 percent is publicly owned. In terms of zoning, the subwatershed is 56.8 percent residential – lower density, 32.3 percent forest, and 11.0 percent unzoned.

The subwatershed has approximately 91.02 miles of roads and a road density of 5.39 miles per square mile. The subwatershed has approximately 243,422 square feet of impervious structural surfaces and 14,562,865 square feet of impervious road surfaces for a total of 14,806,288 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include two historical properties and seven archaeological sites.

The subwatershed has nine wellhead protection areas. No State 303d water quality issues have been identified within this subwatershed.

Swift Reservoir UT

This reach has 1.58 total stream miles under shoreline jurisdiction and 80.49 acres of shoreline jurisdictional area. The existing land uses within this reach are 93.2 percent mining and extraction, 6.8 percent agriculture, forestry, fishing, and hunting, and less than 1 percent transportation, communication, information, and utilities. All of the reach is privately owned. In terms of zoning, the reach is 100 percent residential – lower density. There are approximately 0.29 miles of roads within the reach. It has approximately 45,240.09 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Lewis River #18

This reach has 0.58 total stream miles under shoreline jurisdiction and 26.79 acres of shoreline jurisdictional area. The existing land uses within this reach are 48 percent undefined, 26.2 percent government services, 16 percent mining and extraction establishments, 8.1 percent agriculture, forestry, fishing, and hunting, and 1.8 percent residence or accommodation functions. Approximately 74.1 percent of the reach is publicly owned and 25.9 percent is privately owned. In terms of zoning, the reach is 100 percent residential – lower density. There are no roads or impervious surface designated within this reach. No additional altered conditions are known to be present within this reach.

Lewis River #19

This reach has 0.51 total stream miles under shoreline jurisdiction and 28.33 acres of shoreline jurisdictional area. The existing land uses within this reach are 50 percent mining and extraction establishments, 47.4 percent undefined, and 2.3 percent agriculture, forestry, fishing, and hunting. Approximately 52.6 percent of the reach is privately owned and 47.4 percent is publicly owned. In terms of zoning, the reach is 87.3 percent residential – lower density and 12.7 percent forest. There are no roads or impervious surface designated within this reach. No additional altered conditions are known to be present within this reach.

Swift Reservoir #1
This reach has a total of 200.98 acres and 257.61 acres of jurisdictional area. The existing land uses within this reach are 47.3 percent transportation, communication, information, and utilities, 20.4 percent undefined, 18.2 percent mining and extraction establishments, 14.0 percent government services, and less than 1 percent agriculture, forestry, fishing, and hunting. Approximately 65.5 percent of the reach is privately owned and 34.5 percent is publicly owned. In terms of zoning, the reach is 100 percent residential – lower density.

The reach has approximately 0.93 miles of roads. It has approximately 30,889.68 square feet of impervious structural surfaces and 149,327.61 square feet of impervious road surfaces for a total of 180,217.30 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Swift Reservoir #2
This reach has a total of 482.79 acres and 596.68 acres of jurisdictional area. The existing land uses within this reach are 46.9 percent transportation, communications, information, and utilities, 38.4 percent government services, 7.3 percent mining and extraction establishments, 4.7 percent undefined, 1.3 percent residence or accommodation functions, 1.2 percent agriculture, forestry, fishing, and hunting, and less than 1 percent construction-related business. Approximately 56.8 percent of the reach is privately owned and 43.2 percent is publicly owned. In terms of zoning, the reach is 95.1 percent residential – lower density and 4.9 percent forest.

The reach has approximately 1.29 miles of roads. It has approximately 31,526.15 square feet of impervious structural surfaces and 234,763.96 square feet of impervious road surfaces for a total of 266,290.11 square of impervious surfaces. Wellhead protection areas are located within this reach. No additional altered conditions are known to be present within this reach.

Swift Reservoir #3
This reach has a total of 389.66 acres and 471.64 acres of jurisdictional area. The existing land uses within this reach are 70.1 percent transportation, communications, information, and utilities, 20.6 percent government services, 8.3 percent mining and extraction establishments, and 1 percent agriculture, forestry, fishing, and hunting. Approximately 79.4 percent of the reach is privately owned and 20.6 percent is publicly owned. In terms of zoning, the reach is 100 percent residential – lower density. The reach has approximately 0.03 miles of roads and approximately 5,084.84 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

4.2.18.6 Public Access
The subwatershed includes the eastern portion of Swift Reservoir, which provides a variety of camping, fishing, swimming, and other recreational opportunities. The

subwatershed includes the Swift Reservoir Boat Ramp, Swift Reservoir Campground, Pine Creek Information Center, and the Eagle Cliff Store and Campground. Swift Reservoir UT is relatively inaccessible by road with the exception of a portion of it to the north, which is crossed by an unnamed road. Swift Reservoir #1 is relatively inaccessible with the exception of a portion of its eastern side by an unnamed road. Swift Reservoir #2 can be accessed from NF-90 (closed during winter months), Campground Road 280 Road, North Shore Drive, and Harry Drive. Swift Reservoir #3 is relatively inaccessible, with the exception of a portion of it eastern side by an unnamed road. Lewis River #18 can be accessed from NF-90, NF-370, and NF-9039, while Lewis River #19 can be accessed from NF-25 and NF-90.

Swift Reservoir at Boat Ramp (Skamania County 2015a)

4.2.18.7 Restoration Opportunities

The Upper Swift Reservoir HUC is located within the Upper Lewis River subbasin. Ecological conditions within this subwatershed are generally in good condition, but it has several potential restoration opportunities including: increasing and/or enhancing off-channel and rearing habitat; reducing fine sediment inputs and water temperatures; increasing amounts of large woody debris; continuing the PacifiCorp Energy, Washington Department of Fish and Wildlife, and U.S. Fish and Wildlife fish monitoring programs; and designating conservation easements for increase protections of adjacent riparian zones and aquatic habitat (USFS 2016b, Washington State Conservation Commission 2000b; Haspiel 2015; Federal Energy Regulatory

Commission 2003). Additionally, managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply can improve turbidity, embedded substrates, water quality and stream flow.

4.2.19 Drift Creek (170800020303) – Map Sheets 3b and 3d

4.2.19.1 Overview

The Drift Creek (170800020303) HUC is approximately 12,238.68 total acres in size, and includes 704.03 acres of shoreline jurisdictional area and 6.85 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's approximate downstream location is 46.0235/-122.0899. This subwatershed is located within the Upper Lewis River watershed in the west-central portion of Skamania County, and includes a southeastern portion of Swift Reservoir. Mount Saint Helens National Volcanic Monument is located to the northwest of the subwatershed.

4.2.19.2 Reaches

Drift Creek reach: From the headwaters of Drift Creek to its confluence with Swift Reservoir #4 and Swift Reservoir #5. Its downstream location is 46.0235/-122.0899 and its upstream location is 45.9993/-122.0237. This reach is not a shoreline of statewide significance.

Swift Reservoir #4: This reach is located to the east of the Drift Creek reach the southeastern portion of Swift Reservoir. The center of this waterbody reach is approximately 46.0352/-122.08378. This reach is a shoreline of statewide significance.

Swift Reservoir #5: This reach is located to the west of the Drift Creek reach in the southeastern portion of Swift Reservoir. The center of this waterbody reach is approximately 46.0399/-122.0869. This reach is a shoreline of statewide significance.

4.2.19.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-39.

Table 4-39. Surficial Geology and Soil Types - Drift Creek (17080020303)

Type	Percent
Surficial Geology	
Andesite Flows	54.31%
Volcaniclastic Deposits or Rocks	35.76%
Tuffs and Tuff Breccias	5.61%
Water	2.12%
Alpine Glacial Drift, Fraser-age	1.27%
Diorite Intrusive Andesite	Less than 1% each
Soil Types	
Vitric Haplocryands (CIND/MED)	14.5%
Andic Haplumbrepts (MED/LO-SK, M, FRG)	14.4%
Typic Udivitrands (PUM, M, FRG)	14.2%

Type	Percent
Andic Cryumbrepts (MED/LO-SK, M)	11.8%
Swift cindery sandy loam, 65 to 90% slopes	9.1%
Swift cindery sandy loam, 30 to 65% slopes	7.1%
Aquic Vitricryands (ASHY/MED-SK)	5.2%
Andic Haplumbrepts (MED/C, M, FRG)	4.8%
Typic Vitricryands (ASHY/MED-SK)	4.0%
Vanson sandy loam, 5 to 30% slopes	2.8%
Water	2.3%
Swift cindery sandy loam, 2 to 30% slopes	1.9%
Yalelake sandy loam, 2 to 30% slopes	1.7%
Cinnamon sandy loam, 2 to 30% slopes	1.6%
Lithic Orthents, Andepts, Cryands, Udands	1.3%
Swift-Rock outcrop complex, 65 to 90% slopes; Andic Haplumbrepts (MED/LO, M, FRG); Aquolls, Fibrists, Aquolls; Cinnamon sandy loam, 30 to 65% slopes; Vanson sandy loam, 30 to 65% slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 61.95 percent forested woodland, 35.55 percent recently disturbed or modified land, 1.81 percent open water, 0.43 percent developed other human use, 0.25 percent nonvascular or sparse vascular rock vegetation, and 0.02 percent shrubland and/or grassland. The subwatershed also includes a total of 128.99 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.2.19.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, lake, elk habitat, bald eagle habitat, snag-rich areas, and talus slopes. The PHS species within the subwatershed include northern spotted owl, bald eagle, northern goshawk, and gray wolf. The monitored non-PHS species within the subwatershed include coastal tailed frog and osprey.

Approximately 4.43 miles of Lewis coastal cutthroat are found within the subwatershed. In freshwater, the coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a).

A total of 327.12 acres of NWI wetlands were identified within the subwatershed. These wetlands include 86.13 percent lake, 7.43 percent freshwater forested/shrub wetland, 6.33 percent freshwater emergent wetland, and 0.11 percent freshwater pond.

4.2.19.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 76 percent government services, 22 percent mining and extraction establishments, and 1.2 percent transportation, communication, information, and utilities. Approximately 76.8

percent of the subwatershed is publicly owned and 23.2 percent is privately owned. In terms of zoning, the subwatershed is 71.9 percent forest, 24.3 percent residential – lower density, and 3.8 percent unzoned.

The subwatershed has approximately 73.80 miles of roads and a road density of 3.86 miles per square mile. The subwatershed has approximately 11,566,438 square feet of impervious road surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include 42 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Drift Creek Reach

This reach has 6.85 total stream miles under shoreline jurisdiction and 329.83 acres of shoreline jurisdictional area. The existing land uses within this reach are 87.4 percent government servicesand 12.6 percent mining and extraction establishments. Approximately 63.7 percent of the reach is privately owned and 36.3 percent is publicly owned. In terms of zoning, the reach is 87.4 percent forest and 12.6 percent residential – lower density. There are approximately 0.14 miles of roads within the reach. It has approximately 22,578.17 square feet of impervious road surfaces within the shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Swift Reservoir #4

This reach has a total of 89.32 acres of qualifying shoreline waterbody and 133.74 acres of jurisdictional area. The existing land uses within this reach are 91.1 percent government services, 4.7 percent transportation, communication, information, and utilities, and 4.2 percent mining and extraction establishments. Approximately 58.8 percent of the reach is privately owned and 41.2 percent is publicly owned. In terms of zoning, the reach is 66.8 percent residential – lower density and 33.2 percent forest. This reach has no designated roads or impervious surface within the shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Swift Reservoir #5

This reach has a total of 189.52 acres of qualifying shoreline waterbody and 249.47 acres of jurisdictional area. The existing land uses within this reach are 52.4 percent transportation, communication, information, and utilities, and 47.6 percent government services. Approximately 52.6 percent of the reach is privately owned and 47.4 percent is publicly owned. In terms of zoning, the reach is 82.9 percent residential – lower density and 17.1 percent forest. This reach has no designated

roads or impervious surface within the shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

4.2.19.6 Public Access

The subwatershed includes a southern portion of Swift Reservoir, which provides a variety of fishing, swimming, and other recreational opportunities. The subwatershed has 2.80 miles of trails. There are no designated boat ramps, golf courses, and parks within the subwatershed. The subwatershed is relatively inaccessible by roads with the exception of the northern portion of Drift Creek Reach, which is crossed by an unnamed road.

4.2.19.7 Restoration Opportunities

The Drift Creek HUC is located within the Upper Lewis River subbasin. Ecological conditions within this subwatershed are generally in good condition, but it has several potential restoration opportunities including: increasing and/or enhancing off-channel and rearing habitat; reducing fine sediment inputs and water temperatures; increasing amounts of large woody debris; continuing the PacifiCorp Energy, Washington Department of Fish and Wildlife, and U.S. Fish and Wildlife fish monitoring programs; and designating conservation easements for increase protections of adjacent riparian zones and aquatic habitat (USFS 2016b, Washington State Conservation Commission 2000a; Haspiel 2015; Federal Energy Regulatory Commission 2003). Managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply can improve turbidity, embedded substrates, water quality and stream flow.

4.2.20 Swift Creek (170800020304) – Map Sheets 1 and 3a

4.2.20.1 Overview

The Swift Creek (170800020304) HUC is approximately 13,331.56 total acres, and includes 946.23 acres of shoreline jurisdictional area and 10.24 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is approximately 46.065/-122.194. This subwatershed is located within the Upper Lewis River watershed in the central west portion of Skamania County, and includes a northwestern portion of Swift Reservoir and the western portion of Devil's Backbone. Mount Saint Helens National Volcanic Monument is located further to the north of the subwatershed.

4.2.20.2 Reaches

Swift Creek #1: From its headwaters to its confluence with Worm Flows and Swift Creek #2. Its downstream location is 46.1037/-122.1875, and its upstream location is 46.1419/-122.1715. This reach is not a shoreline of statewide significance.

Swift Creek #2: From its confluence with Swift Creek #3 and West Fork Swift Creek to its confluence with Worm Flows and Swift Creek #1. Its downstream location is 46.0970/-122.1966, and its upstream location is 46.1037/-122.1875. This reach is not a shoreline of statewide significance.

Swift Creek #3: From its confluence with Swift Creek UT and Swift Creek #4 to its confluence with West Fork Swift Creek and Swift Creek #2. Its downstream location is 46.0954/-122.1989, and its upstream location is 46.0970/-122.1966. This reach is not a shoreline of statewide significance.

Swift Creek #4: From the northwestern portion of Swift Reservoir (Swift Reservoir #10 and Swift Reservoir #11) to its confluence with Swift River UT and Swift River #3. Its downstream location is 46.0842/-122.2001, and its upstream location is 46.0954/-122.1989. This reach is not a shoreline of statewide significance.

Swift Creek UT: From its headwaters to its confluence with Swift Creek #3 and Swift Creek #4. Its downstream location is 46.0954/-122.1988732, and its upstream location is 46.0942/-122.1938394. This reach is not a shoreline of statewide significance.

West Fork Swift Creek: From its headwaters to its confluence with Swift Creek #2 and Swift Creek #3. Its downstream location is 46.0970/-122.1966, and its upstream location is 46.1180/-122.2023. This reach is not a shoreline of statewide significance.

Worm Flows: From its headwaters to its confluence with Swift Creek #1 and Swift Creek #2. Its downstream location is 46.1037/-122.1875, and its upstream location is 46.1290/122.1515. This reach is not a shoreline of statewide significance.

Swift Reservoir #11: Northwestern portion of Swift Reservoir located north of the Swift Dam and Swift Reservoir #12 and west of Swift Creek #4. The center of this waterbody is at approximately 46.0724/-122.1969. This reach is a shoreline of statewide significance.

Swift Reservoir #10: Northwestern portion of Swift Reservoir located east of Swift Creek #4 and west of Swift Creek #9. The center of this waterbody is at approximately 46.0712/-122.1921. This reach is a shoreline of statewide significance.

4.2.20.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-40.

Table 4-40. Surficial Geology and Soil Types - Swift Creek (170800020304)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	49.35%
Andesite Flows	25.9%
Basalt Flows	18.43%
Lahars	2.53%
Water	1.88%
Alluvium; Diorite; Ice; Volcanic Rocks	Less than 1% of each
Soil Types	
Lonestar cindery sandy loam, 5 to 30% slopes	14.7%

Type	Percent
Rock outcrop-Rubbleland complex	14.1%
Shoestring fine sandy loam, 0 to 30% slopes	8.3%
Forsyth cindery loamy sand, 65 to 120% slopes	7.3%
Cinnamon sandy loam, 2 to 30% slopes	6.5%
St. Helens sandy loam, 0 to 30% slopes	5.3%
Swift cindery sandy loam, 30 to 65% slopes	4.9%
Pelee sandy loam, 30 to 65% slopes	4.3%
Lithic Umbric Vitrandepts, 0 to 15% slopes	4.0%
Fortran cindery loamy sand, 65 to 120% slopes	4.0%
Vanson sandy loam, 30 to 65% slopes	3.3%
Polepatch extremely bouldery loamy sand, 0 to 30% slopes	2.5%
Vanson sandy loam, 65 to 90% slopes	2.5%
Vanson sandy loam, cold, 30 to 65% slopes	2.5%
Swift cindery sandy loam, 65 to 90% slopes	2.2%
Water	2.1%
Lonestar cindery sandy loam, 30 to 65% slopes	2.0%
Cinnamon sandy loam, 30 to 65% slopes	1.5%
Forsyth cobbly loamy sand, 0 to 30% slopes	1.5%
Yalelake sandy loam, 2 to 30% slopes	1.4%
Histic Cryaquepts, 0 to 5% slopes	1.3%
Pelee sandy loam, 5 to 30% slopes	1.0%
Forsyth stony loamy sand, 0 to 30% slopes; Hatchet-Rock outcrop complex, 65 to 90% slopes; Hatchet gravelly sandy loam, 65 to 90% slopes; Pits; Swift-Rock outcrop complex, 30 to 65% slopes; Swift cindery sandy loam, 2 to 30% slopes; Vanson-Rock outcrop complex, 30 to 65% slopes; Vanson-Rock outcrop complex, 65 to 90% slopes; Vanson sandy loam, 5 to 30% slopes; Yalelake sandy loam, 30 to 65% slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 67.57 percent forested woodland, 18.27 percent recently disturbed or modified land, 11.80 percent nonvascular or sparse vascular rock vegetation, 1.91 percent open water, and less than 1 percent of each of the following developed other human use, high montane vegetation, and shrubland and/or grassland. The subwatershed also includes a total of 310.96 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.2.20.4 Biological Resources

The PHS priority habitat types within the subwatershed are freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, lake, riverine wetland, elk habitat. The PHS species within the subwatershed include northern spotted owl and Townsend's big-eared bat. Approximately 3.15 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. In freshwater, the Lewis coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a).

A total of 465.59 acres of NWI wetlands were identified within the subwatershed. These wetlands include 56.69 percent lake, 30.45 percent freshwater forested/shrub wetland, 8.82 percent freshwater emergent wetland, 3.23 percent riverine wetland, and 0.80 percent freshwater pond.

4.2.20.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are approximately 71.1 percent government services, 25.1 percent mining and extraction establishments, 3.0 percent transportation, communication, information, and utilities, and less than one percent of each of the following: agriculture, forestry, fishing, and hunting, residence or accommodation functions, and undefined land uses. Approximately 72.4 percent of the subwatershed is percent is publicly owned and 27.6 percent is privately owned. In terms of zoning, the subwatershed is approximately 51.3 percent unzoned, 26.8 percent forest, and 22.0 percent residential – lower density.

The subwatershed has approximately 70.86 miles of roads with a road density of 3.40 miles per square mile. The subwatershed has approximately 14,148 square feet of impervious structural surfaces and 11,514,216 square feet of impervious road surfaces for a total of 11,528,364 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include two archaeological sites. The subwatershed has four wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

Swift Creek #1

This reach has 3.02 total stream miles under shoreline jurisdiction and 145.93 acres of shoreline jurisdictional area. The existing land uses within this reach are 76.7 percent government servicesand 23.3 percent mining and extraction establishments. Approximately 76.7 percent of the reach is publicly owned and 23.3 percent is privately owned. In terms of zoning, the reach is 39.2 percent residential – lower density, 37.4 percent unzoned, and 23.3 percent forest. There are approximately 0.41 miles of roads within the reach with approximately 70,301.99 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Swift Creek #2

This reach has 0.69 total stream miles under shoreline jurisdiction and 31.73 acres of shoreline jurisdictional area. All of the existing land use within this reach is mining and extraction establishments and is privately owned. In terms of zoning, the reach is all forest. There are no designated roads or impervious surface within this reach. No additional altered conditions are known to be present within this reach.

Swift Creek #3
This reach has 0.20 total stream miles under shoreline jurisdiction and 9.02 acres of shoreline jurisdictional area. All of the existing land use within this reach is mining and extraction establishments and is privately owned. In terms of zoning, the reach is all forest. There are no designated roads or impervious surface within this reach. No additional altered conditions are known to be present within this reach.

Swift Creek #4
This reach has 1.43 total stream miles under shoreline jurisdiction and 69.72 acres of shoreline jurisdictional area. The existing land uses within this reach are 40.26 percent mining and extraction establishments, 25.76 percent government services, 3.65 percent agriculture, forestry, fishing, and hunting, and 0.05 percent transportation, communication, information, and utilities. Approximately 63.1 percent of the reach is privately owned and 36.9 percent is publicly owned. In terms of zoning, the reach is 57.7 percent forest and 42.3 percent residential – lower density. There are approximately 0.09 miles of roads within the reach. It has approximately 55,125.29 square feet of impervious road surfaces. Wellhead protection areas area located within this reach. No additional altered conditions are known to be present within this reach.

Swift Creek, UT
This reach has 0.26 total stream miles under shoreline jurisdiction and 13.06 acres of shoreline jurisdictional area. All of the existing land use within this reach is mining and extraction establishments and is privately owned. In terms of zoning, the reach is all forest. There are no designated roads or impervious surface within this reach. No additional altered conditions are known to be present within this reach.

West Fork Swift Creek
This reach has 1.57 total stream miles under shoreline jurisdiction and 75.27 acres of shoreline jurisdictional area. The existing land uses within this reach are 71.5 percent mining and extraction establishments and 28.5 percent government services. Approximately 71.5 percent of the reach is privately owned and 28.5 percent is publicly owned. In terms of zoning, the reach is 71.5 percent forest and 28.5 percent residential – lower density. There are no designated roads or impervious surface within this reach. No additional altered conditions are known to be present within this reach.

Worm Flows
This reach has 3.07 total stream miles under shoreline jurisdiction and 231.46 acres of shoreline jurisdictional area. The existing land uses within this reach are 84.1 percent government servicesand 15.9 percent mining and extraction establishments. Approximately 84.1 percent of the reach is publicly owned and 15.9 percent is privately owned. In terms of zoning, the reach is 47.9 percent unzoned, 36.2 percent residential – lower density, and 15.9 percent forest. There are approximately

0.47 miles of roads within the reach. It has approximately 73,946square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Swift Reservoir #10

This reach includes158.11 acres of waterbody and contains 205.44 acres of jurisdictional area. The existing land uses within this reach are 63.3 percent transportation, communication, information, and utilities, 36.1 percent government services, and 0.6 percent mining and extraction establishments. Approximately 55.2 percent of the reach is privately owned and 44.8 percent is publicly owned. In terms of zoning, the reach is 99.4 percent residential – lower density and 0.6 percent forest. There are no designated roads or impervious surface within this reach. Wellhead protection areas are located within this reach. No additional altered conditions are known to be present within this reach.

Swift Reservoir #11

This reach includes 123.91 acres of waterbody and 164.61 acres of jurisdictional area. The existing land uses within this reach are 70.8 percent transportation, communication, information, and utilities, 25.3 percent government services, 2.2 percent agriculture, forestry, and fishing, 1.6 percent residence or accommodation functions, and 0.1 percent mining and extraction establishments. Approximately 74.7 percent of the reach is privately owned and 25.3 percent is publicly owned. In terms of zoning, the reach is 99.9 percent residential – lower density and 0.1 percent forest. There are no designated roads or impervious surface within this reach. No additional altered conditions are known to be present within this reach.

4.2.20.6 Public Access

The subwatershed includes a western portion of Swift Reservoir, which provides a variety of fishing, swimming, and other recreational opportunities. The subwatershed includes 36.32 miles of trails, the Sno-Park Marble Mountain, and Ape Cave. There are no designated boat ramps or golf courses. Swift Creek #1 is relatively inaccessible with the exception of its northern portion, which is crossed by an unnamed road. Swift Creek #2 and #3 are relatively inaccessible by roads. Swift Creek #4 is relatively accessible by NF-90, NF-83, and Road 7900. Swift Creek UT is relatively accessible by Road 7900 and unnamed roads. West Fork Swift Creek is relatively inaccessible with the exception of its northern portion, which is crossed by an unnamed road. Worm Flows is relatively inaccessible with the exception of its northern portion, which is crossed NF-8312. Swift Reservoir #10 and Swift Reservoir #11 are relatively accessible from NF-90.

4.2.20.7 Restoration Opportunities

The Swift Creek HUC is located within the Upper Lewis River subbasin. Ecological conditions within this subwatershed are generally in good condition, but it has

several potential restoration opportunities including: increasing and/or enhancing rearing and spawning habitat; reducing fine sediment inputs; reducing water temperatures; increasing amounts of large woody debris; continuing the PacifiCorp Energy, Washington Department of Fish and Wildlife, and U.S. Fish and Wildlife fish monitoring programs, reducing bull trout entrainment at the Swift Dam, and designating conservation easements for increased protection of adjacent riparian zones and aquatic habitat (USFS 2016b, Washington State Conservation Commission 2000b; Haspiel 2015; Federal Energy Regulatory Commission 2003). Additionally, managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply can improve turbidity, embedded substrates, water quality and stream flow.

4.2.21 Lower Swift Reservoir (170800020305) – Map Sheets 3a, 3b, 3c, and 3d

4.2.21.1 Overview

The Lower Swift Reservoir (170800020305) HUC is approximately 16,994.30 total acres, and includes 3,473.09 acres of shoreline jurisdictional area and 2.71 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's approximate downstream location is 46.0490/-122.0800 and its approximate upstream location is 46.065/-122.194. This subwatershed is located within the Upper Lewis River watershed in the central-west portion of Skamania County, and includes the northern and southern portions of the western part of Swift Reservoir and the eastern portion of Devil's Backbone. Mount Saint Helens National Volcanic Monument is located to the north and northwest of the subwatershed.

4.2.21.2 Reaches

Range Creek: This reach flows north from its headwaters to its confluence with Swift Reservoir. Its downstream location is 46.0362/-122.1202 and its upstream location is 46.0116/-122.1257. This reach is not shoreline of statewide significance.

Marble Creek: From its headwaters, the reach flows in a southwest direction to its confluence with Swift Reservoir. Its downstream location is 46.0683/-122.1466 and its upstream location is 46.0752/-122.1385. This reach is not a shoreline of statewide significance.

Swift Reservoir #6: Central-south portion of Swift Reservoir located east of Range Creek and west of the Drift Creek HUC. The center of this reach waterbody is at 46.0486/-122.1035. This reach is a shoreline of statewide significance.

Swift Reservoir #7: Central-north portion of Swift Reservoir located east of Marble Creek. The center of this reach waterbody is at 46.0573/-122.1069. This reach is a shoreline of statewide significance.

Swift Reservoir #8: Southwestern portion of Swift Reservoir located west of Range Creek. The center of this reach waterbody is at 46.0608/-122.1580. This reach is a shoreline of statewide significance.

Swift Reservoir #9: Northwestern portion of Swift Reservoir located west of Marble Creek and east of Swift Reservoir #12. The center of this reach waterbody is at 46.0653/-122.1693. This reach is a shoreline of statewide significance.

Swift Reservoir #12: Western portion of Swift Reservoir located at the Swift Dam. The center of this feature is at 46.0637/-122.1961. This reach is a shoreline of statewide significance.

4.2.21.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-41.

Table 4-41. Surficial Geology and Soil Types - Lower Swift Reservoir (170800020305)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	49.83%
Basalt Flows	17.2%
Water	16.5%
Andesite Flows	13.6%
Tuffs and Tuff Breccias	2.01%
Alpine glacial drift, Fraser-age; Intrusive Andesite; Granodiorite	Less than 1% each
Soil Types	
Water	17.0%
Cinnamon sandy loam, 2 to 30% slopes	14.9%
Swift-Rock outcrop complex, 65 to 90% slopes	13.1%
Swift cindery sandy loam, 30 to 65% slopes	13.1%
Cinnamon sandy loam, 30 to 65% slopes	8.9%
Swift cindery sandy loam, 65 to 90% slopes	4.8%
Vanson-Rock outcrop complex, 65 to 90% slopes	4.5%
Yalelake sandy loam, 2 to 30% slopes	4.3%
Yalelake sandy loam, 30 to 65% slopes	3.8%
Swift cindery sandy loam, 2 to 30% slopes	3.4%
Vanson sandy loam, 65 to 90% slopes	2.8%
Lonestar cindery sandy loam, 5 to 30% slopes	2.7%
Lonestar cindery sandy loam, 30 to 65% slopes	1.5%
Vitric Haplocryands (CIND/MED)	1.2%
Andic Haplumbrepts (MED/LO-SK, M, FRG); Arents, 0 to 5% slopes; Cinnamon sandy loam, 65 to 90% slopes; Fortran cindery loamy sand, 65 to 120% slopes; Hatchet-Rock outcrop complex, 65 to 90% slopes; Histic Cryaquepts, 0 to 5% slopes; Lithic Orthents, Andepts, Cryands, Udands; Pits; Polepatch extremely bouldery loamy sand, cold, 0 to 30% slopes; Rock outcrop-Rubbleland complex; Swift-Rock outcrop complex, 30 to 65% slopes; Typic Udivitrands (PUM, M, FRG);	Less than 1% each

Type	Percent
Underwood loam, 30 to 50% slopes; Vanson sandy loam, 30 to 65% slopes; Vanson sandy loam, 5 to 30% slopes; Yalelake sandy loam, 65 to 90% slopes; Zygore gravelly loam, 30 to 65% slopes	

Vegetated cover within the subwatershed is composed of 48.59 percent forested woodland, 34.01 percent recently disturbed or modified land, 16.78 percent open water, 0.44 percent developed other human use, 0.15 percent nonvascular or sparse vascular rock vegetation, 0.2 percent agriculture, and 0.01 percent shrubland and/or grassland. The subwatershed also includes a total of 3,068.26 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.2.21.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, lake, elk habitat, bald eagle habitat, herbaceous bald, mule and black-tailed deer habitat, and snag-rich areas. The PHS species within the subwatershed include northern spotted owl, bald eagles, and osprey.

Approximately 9.02 stream miles of Lewis coastal cutthroat habitat and 5.83 stream miles of Lewis bull trout habitat are found within the subwatershed. In freshwater, the Lewis coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a). Bull trout have many different life histories that can vary by individual population, which may include: remaining in small streams their entire life; migrating between small streams and larger rivers; or migrating into lakes or reservoirs and then back to streams or rivers for spawning (Washington Department of Fish and Wildlife 2015b).

A total of 2,935.47 acres of NWI wetlands were identified within the subwatershed. These wetlands include 99.62 percent lake, 0.33 percent freshwater forested/shrub wetland, and 0.05 percent freshwater emergent wetland.

4.2.21.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 55.4 percent mining and extraction establishments, 28.7 percent government services, 12.5 percent transportation, communication, information, and utilities, 2.3 percent agriculture, forestry, fishing, and hunting, and less than one percent of each of the following: residence or accommodation functions and undefined land use. Approximately 70.5 percent of the subwatershed is privately owned and 29.5 percent is publicly owned. In terms of zoning, the subwatershed is 64.6 percent forest and 35.4 percent residential – lower density.

The subwatershed has approximately 138.12 miles of roads with a road density of 5.20 miles per square mile. The subwatershed has approximately 64,988 square feet

of impervious structural surfaces and 22,868,042 square feet of impervious road surfaces for a total of 22,933,029 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include two archaeological sites.

The subwatershed has two wellhead protection areas. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with total dissolved gas and temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

The Swift Dam is located within the subwatershed at the western end of Swift Reservoir at 46.0632/-122.1979. This hydroelectric dam is owned and operated by PacifiCorp Energy. It was originally built in 1958 and created the Swift Reservoir.

Range Creek

This reach has 46.04 total stream miles under shoreline jurisdiction and 99.44 acres of shoreline jurisdictional area. The only existing land use within this reach is mining and extraction establishments. All of the reach is privately owned. In terms of zoning, the reach is 62.0 percent forest and 38.0 percent residential – lower density. There are approximately 0.27 miles of roads within the reach's shoreline jurisdiction with approximately 55,125.29 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Marble Creek

This reach has 46.07 total stream miles under shoreline jurisdiction and 34.92 acres of shoreline jurisdictional area. The existing land uses within this reach are 79.4 percent mining and extraction establishments, 9.8 percent agriculture, forestry, fishing, and hunting, 6.6 percent undefined land use, 3.1 percent residence or accommodation functions, and 1.1 percent government services. Approximately 92.3 percent of the reach is privately owned and 7.7 percent is publicly owned. In terms of zoning, the reach is 51.4 percent forest and 48.6 percent residential – lower density. There are approximately 0.13 miles of roads within the reach's shoreline jurisdiction with approximately 27,942.34 square feet of impervious surfaces. A wellhead protection area is located within this reach. No additional altered conditions are known to be present within this reach.

Swift Reservoir #6

This reach has a total of 432.77 acres and 488.69 acres of jurisdictional area. The existing land uses within this reach are 82.3 percent transportation, communication, information, and utilities, 15.0 percent government services, and 2.6 percent mining and extraction establishments. Approximately 85.0 percent of the reach is privately owned and 15.0 percent is publicly owned. In terms of zoning, the reach is 91.3

percent residential – lower density and 8.7 percent forest. The reach's shoreline jurisdiction has no designated road miles or impervious surface. No additional altered conditions are known to be present within this reach.

Swift Reservoir #7

This reach has a total of 1,149.57 acres and 1,256.29 acres of jurisdictional area. The existing land uses within this reach are 63.6 percent transportation, communication, information, and utilities, 30.4 percent government services, 5.6 percent mining and extraction establishments, and 0.4 percent agriculture, forestry, fishing, and hunting. Approximately 69.6 percent of the reach is privately owned and 30.4 percent is publicly owned. In terms of zoning, the reach is 94.4 percent residential – lower density and 5.6 percent forest. The reach's shoreline jurisdiction has approximately 0.27 miles of roads and approximately 49,849.94 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Swift Reservoir #8

This reach has a total of 743.41 acres and 894.62 acres of jurisdictional area. The existing land uses within this reach are 53.9 percent government services, 44.7 percent transportation, communication, information, and utilities, and 1.3 percent mining and extraction establishments. Approximately 53.9 percent is publicly owned and 46.1 percent of the reach is privately owned. In terms of zoning, the reach is 86.5 percent residential – lower density and 13.5 percent forest. The reach's shoreline jurisdiction has approximately 0.04 miles of roads. It has approximately 5,516.36 square feet of impervious structural surfaces and 186.09 square feet of impervious road surfaces for a total of 5,702.45 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Swift Reservoir #9

This reach has a total of 562.88 acres and 639.84 acres of jurisdictional area. The existing land uses within this reach are 50.1 percent transportation, communication, information, and utilities, 43.4 percent government services, 3.7 percent agriculture, forestry, fishing, and hunting, and 2.5 percent mining and extraction establishments. Approximately 56.5 percent of the reach is privately owned and 43.5 percent is publicly owned. All of the reach is zoned as residential – lower density. There are approximately 0.33 miles of roads within the reach's shoreline jurisdiction. It has approximately 55,544.61 square feet of impervious structural surfaces and 1,049.45 square feet of impervious road surfaces for a total of 56,594.06 square feet of impervious surfaces. This reach has 303(d) listings associated with total dissolved gas and temperature. A wellhead protection area is located within this reach. No additional altered conditions are known to be present within this reach.

Swift Reservoir #12

This reach has a total of 51.81 acres and 59.28 acres of jurisdictional area. The existing land uses within this reach are 69.5 percent government servicesand 30.5 percent transportation, communication, information, and utilities. Approximately 69.5 percent is publicly owned and 30.5 percent of the reach is privately owned. All of the reach is zoned as residential – lower density. The reach has approximately 0.23 miles of roads with approximately 33,993.34 square feet of impervious surfaces. This reach has 303(d) listings associated with total dissolved gas and temperature. No additional altered conditions are known to be present within this reach.

4.2.21.6 Public Access

The subwatershed includes the western portion of Swift Reservoir, which provides a variety of fishing, swimming, and other recreational opportunities. The subwatershed has 2.12 miles of trails. Range Creek can be accessed by unnamed roads. The southern portion of Marble Creek is accessible by NF-90, and its northern portion can be accessed by unnamed roads. The middle portion of Marble Creek is relatively inaccessible. Swift Reservoir #6 and Swift Reservoir #8 are relatively inaccessible by roads, with some unnamed roads located further south of the reaches. Swift Reservoir #7 is relatively accessible by NF-90 and Forest Road 7906. Portions of Swift Reservoir #9 are relatively accessible by NF-90, Forest Road 7960, and unnamed roads. Swift Reservoir #12 is accessible by NF-90.

4.2.21.7 Restoration Opportunities

The Lower Swift Reservoir HUC is located within the Upper Lewis River subbasin. Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with total dissolved gas and temperature within the subwatershed, and it has several potential restoration opportunities including: increasing and/or enhancing rearing and spawning habitat; reducing fine sediment inputs; reducing water temperatures; increasing amounts of large woody debris; continuing the PacifiCorp Energy, WDFW, and USFWS fish monitoring programs; reducing bull trout entrainment at the Swift Dam; and designating conservation easements for increase protections of adjacent riparian zones and aquatic habitat (USFS 2016b, Washington State Conservation Commission 2000b; Haspiel 2015; Federal Energy Regulatory Commission 2003). Additionally, managing forest practices, and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply can improve turbidity, embedded substrates, water quality and stream flow.

4.2.22 Cougar Creek-Lewis River (170800020401) – Map Sheet 3a

4.2.22.1 Overview

The Cougar Creek-Lewis River (170800020401) HUC is approximately 12,376.48 total acres in size, and includes 522.95 acres of shoreline jurisdictional area and 8.79 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is approximately 46.0539/-122.2459. This subwatershed is

located within the Middle Lewis River watershed in the west-central portion of Skamania County southwest of Mount Saint Helens National Volcanic Monument.

4.2.22.2 Reaches

Ole Creek: This reach flows in a northwest direction from its headwaters to its confluence with Lewis River #20. Its downstream location is 46.0519/-122.2458, and its upstream location is 46.0430/-122.2351. This reach is not a shoreline of statewide significance.

Lewis River #20: From the Swift Dam to the Skamania County/Clark County border. Its downstream location is 46.0539/-122.2459, and its upstream location is 46.0603/ 122.1975. This reach is a shoreline of statewide significance.

Glacial runoff, unnamed: From its headwaters on the south flanks of Mount Saint Helens to the Skamania County/Clark County border, before its confluence with Lewis River. Its downstream location is 46.0620/-122.2458, and its upstream location is 46.1231/-122.2193. This reach is not a shoreline of statewide significance.

4.2.22.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-42.

Table 4-42. Surficial Geology and Soil Types - Cougar Creek - Lewis River (170800020401)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	46.5%
Andesite Flows	28.07%
Basalt Flows	18.34%
Alluvium	5.49%
Water; Granodiorite; Artificial Fill, including Modified Land; Ice; Lahars; Volcanic rocks	Less than 1% each
Soil Types	
Lithic Umbric Vitrandepts, 0 to 15% slopes	23.9%
Swift cindery sandy loam, 30 to 65% slopes	12.2%
Swift cindery sandy loam, 65 to 90% slopes	8.3%
Yalelake sandy loam, 2 to 30% slopes	7.5%
Swift-Rock outcrop complex, 65 to 90% slopes	7.1%
Cinnamon sandy loam, 2 to 30% slopes	5.7%
Rock outcrop-Rubbleland complex	5.3%
Fortran cindery loamy sand, 65 to 120% slopes	4.0%
Lonestar cindery sandy loam, 5 to 30% slopes	3.9%
Cinnamon sandy loam, 30 to 65% slopes	3.4%
Bonneville stony sandy loam	3.3%
Swift cindery sandy loam, 2 to 30% slopes	2.8%
Vanson-Rock outcrop complex, 65 to 90% slopes	2.3%
Vanson sandy loam, 30 to 65% slopes	2.0%
Vanson sandy loam, 65 to 90% slopes	1.4%

Type	Percent
Riverwash	1.2%
Aquolls, Fibrists, Aquods; Arents, 0 to 5% slopes; Hatchet-Rock outcrop complex, 65 to 90% slopes; Hatchet gravelly sandy loam, 30 to 65% slopes; Hatchet, cold-Rock outcrop complex, 30 to 65% slopes; Histic Cryaquepts, 0 to 5% slopes; Lonestar cindery sandy loam, 30 to 65% slopes; Non-applicable (N/A) soils; Pits; Shoestring fine sandy loam, 0 to 30% slopes; St. Helens sandy loam, 0 to 30% slopes; Typic Udivitrands (PUM, M, FRG); Vanson sandy loam, 5 to 30% slopes; Vitric Haplocryands (CIND/MED); Water; Yalelake sandy loam, 30 to 65% slopes; Zymer sandy loam, 30 to 65% slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 88.05 percent forested woodland, 6.96 percent recently disturbed or modified land, 3.91 percent nonvascular or sparse vascular rock vegetation, and less than one percent of each of the following: shrubland and/or grassland, open water, developed other human use, high montane vegetation, and agriculture. The subwatershed also includes a total of 2.06 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.2.22.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, lake, riverine wetland, elk habitat, herbaceous bald, bald eagle habitat, and caves or cave-rich areas. The PHS species within the subwatershed include northern spotted owl, bald eagle, Townsend's big-eared bat, Yuma myotis, Larch Mountain salamander, and Van Dyke's salamander. The monitored non-PHS species within the subwatershed is osprey.

Approximately 5.96 stream miles of Lewis coastal cutthroat habitat and 2.68 stream miles of Lewis bull trout habitat are found within the subwatershed. In freshwater habitat, coastal cutthroat prefers deep pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a). Bull trout have many different life histories that can vary by individual population, which may include: remaining in small streams their entire life; migrating between small streams and larger rivers; or migrating into lakes or reservoirs and then back to streams or rivers for spawning (Washington Department of Fish and Wildlife 2015b).

A total of 204.34 acres of NWI wetlands were identified within the subwatershed. These wetlands include 42.06 percent freshwater forested/shrub wetland, 27.44 percent riverine wetland, 27.07 percent lake, 1.74 percent freshwater pond, and 1.69 percent freshwater emergent wetland.

4.2.22.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 88.5 percent government services, 6.3 percent mining and extraction establishments, 2.8 percent transportation, communication, information, and utilities, 1.2 percent undefined, and less than one percent of each of the following: construction-related business, agriculture, forestry, fishing, and hunting, and residence or accommodation functions. Approximately 92 percent of the subwatershed is publicly owned and 8.0 percent is privately owned. In terms of zoning, the subwatershed is 51.0 percent residential – lower density, 28.2 percent forest, and 20.8 percent unzoned.

The subwatershed has approximately 45.21 miles of roads and a road density of 2.34 miles per square mile. The subwatershed has approximately 92,283 square feet of impervious structural surfaces and 7,736,374 square feet of impervious road surfaces for a total of 7,828,657 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include one historic property.

No wellhead protection areas or utility infrastructure are known to be present within this subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with total dissolved gas and another associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Ole Creek

This reach has 0.99 total stream miles under shoreline jurisdiction and 49.12 acres of shoreline jurisdictional area. The existing land uses within this reach are 92.9 percent government servicesand 7.1 percent mining and extraction establishments. Approximately 92.9 percent of the reach is publicly owned and 7.1 percent is privately owned. In terms of zoning, the reach is 70.4 percent forest and 29.6 percent residential – lower density. There are approximately 0.43 miles of roads within the reach's shoreline jurisdiction and approximately 81,571.47 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Lewis River #20

This reach has 2.66 total stream miles under shoreline jurisdiction and 223.03 acres of shoreline jurisdictional area. The existing land uses within this reach are 35.6 percent undefined, 16.5 percent government services, 36.6 percent transportation, communication, information, and utilities, and 11.3 percent mining and extraction establishments. Approximately 79 percent of the reach is publicly owned and 21 percent is privately owned. All of the reach is zoned as residential – lower density.

There are approximately 0.44 miles of roads within the reach's shoreline jurisdiction. It has approximately 81,148 square feet of impervious structural surfaces and 5,384.59 square feet of impervious road surfaces for a total of 86,645 square feet of impervious surfaces. This reach has two 303(d) listings associated with total dissolved gas and another associated with temperature. No additional altered conditions are known to be present within this reach.

Glacial runoff, unnamed

This reach has 5.15 total stream miles under shoreline jurisdiction and 250.79 acres of shoreline jurisdictional area. The existing land uses within this reach are 99.3 percent government services and 0.7 percent transportation, communication, information, and utilities. All of the reach is publicly owned. All of the reach is zoned as residential – lower density.

There are approximately 0.77 miles of roads within the reach's shoreline jurisdiction. It has approximately 120,449.52 square feet of impervious structural surfaces and 588.72 square feet of impervious road surfaces for a total of 121,038.24 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

4.2.22.6 Public Access

The subwatershed has 6.54 miles of trails southwest of the Mount Saint Helens National Volcanic Monument. There are no boat ramps, golf courses, or parks. Ole Creek and Lewis River #20 are relatively accessibly by Road 90 and unnamed roads. The Glacial runoff, unnamed reach is inaccessible by roads.

4.2.22.7 Restoration Opportunities

Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with total dissolved gas and temperature within the subwatershed. Some restoration opportunities within the Cougar Creek-Lewis River HUC could include, but are not limited to: creating site channel/off-channel habitat, in-channel improvements, wetland restoration, floodplain reconnection, and riparian preservation and restoration (Washington State Department of Ecology 2008a). Many of these actions may help restore refugia, spawning habitat, invertebrate production, over-wintering habitat, wood and gravel recruitment, sediment sorting, bedform diversity, bed material retention, stream flow, channel and bank stability, hydraulic diversity, and nutrient input (Washington State Department of Ecology 2008a). Additionally, managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply can improve turbidity, embedded substrates, water quality and stream flow.

4.2.23 Upper Siouxon Creek (170800020402) – Map Sheets 3, 3c, and 3d

4.2.23.1 Overview

The Upper Siouxon Creek (170800020402) HUC is approximately 14,567.94 total acres, and includes 547.70 acres of shoreline jurisdictional area and 8.43 miles of streams under shoreline jurisdiction. Using WGS 84, the subwatershed's downstream location is approximately 45.9558/-122.1554. This subwatershed is located within the Middle Lewis River watershed in the west-central portion of Skamania County. The subwatershed is located on U.S. Forest Service land.

4.2.23.2 Reaches

Calamity Creek: From its headwaters to its confluence with Siouxon Creek #1. Its downstream location is 45.9461/-122.0979, and its upstream location is 45.9323/ 122.1018. This reach is not a shoreline of statewide significance.

Siouxon Creek #1: From its headwaters to its confluence with Calamity Creek. Its downstream location is 45.9461/-122.0979, and its upstream location is 45.9355/ 122.0751. This reach is not a shoreline of statewide significance.

Siouxon Creek #2: From its confluence with Calamity Creek to its confluence with Chinook Creek. Its downstream location is 45.9600/-122.1177, and its upstream location is 45.9461/-122.0979. This reach is not a shoreline of statewide significance.

Siouxon Creek #3: From its confluence with Chinook Creek to the western Upper Siouxon Creek HUC boundary. Its downstream location is 45.9558/-122.1554, and its upstream location is 45.9600/-122.1177. This reach is not a shoreline of statewide significance.

Chinook Creek: From its headwaters to its confluence with Siouxon Creek. Its downstream location is 45.9600/-122.1177, and its upstream location is 45.9790/-122.1004. This reach is not a shoreline of statewide significance.

4.2.23.3 Physical environment

The subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-43.

Table 4-43. Surficial Geology and Soil Types - Upper Siouxon Creek (170800020402)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	85.27%
Basaltic Andesite Flows	11.65%
Intrusive Andesite	1.06%
Alluvium	0.02%
Andesite Flows, Diorite, and Alpine Glacial Drift (Fraser Age)	Less than 1%
Soil Types	
Andic Haplumbrepts (MED/LO-SK, M, FRG)	40.1%
Andic Cryumbrepts (MED/LO-SK, M)	21.1%

Type	Percent
Typic Udivitrands (PUM, M, FRG)	13%
Lithic Orthents, Andepts, Cryands, Udands,	5.9%
Vitric Haplocryands (CIND/MED)	1.7%
Andic Haplumbrepts (MED/LO, M, FRG	1.6%
Aquic Vitricryands (ASHY/MED-SK), Non-Applicable Soils (N/A), and Aquolls, Fibrists, and Aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 78.31 percent forested woodland, 20.49 percent recently disturbed or modified land, 0.84 percent shrubland and/or grassland, and 0.36 percent developed other human use,

4.2.23.4 Biological resources

The PHS priority habitat type within the subwatershed includes elk, herbaceous bald, snag-rich areas, and talus slopes. The PHS species within the subwatershed include northern spotted owl and gray wolf. No federally or state listed fish presence is mapped within the subwatershed. No NWI wetlands were identified within the subwatershed.

4.2.23.5 Land use and altered conditions

The only existing land use within the subwatershed is government services. All of the subwatershed is publicly owned. In terms of zoning, 57.9 percent of the watershed is designated as forest and 42.1 percent as unzoned.

The subwatershed has approximately 55.28 miles of roads and a road density of 2.43 miles per square mile. The subwatershed has approximately 8,681,907 square feet of impervious road surfaces.

Known archeological, cultural, or historical resources within the subwatershed include 16 archeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Calamity Creek

This reach has 1.04 total stream miles under shoreline jurisdiction and 118.03 acres of shoreline jurisdictional area. All of this reach is designated as services – government and is publicly owned. In terms of zoning, all of the reach is designated as unzoned. There are no roads or impervious surface in the reach. No additional altered conditions are known to be present within this reach.

Siouxon Creek 1

This reach has 1.41 total stream miles under shoreline jurisdiction and 28.33 acres of shoreline jurisdictional area. All of this reach is designated as government services and is publicly owned. In terms of zoning, all of the reach is designated as unzoned.

There are no roads or impervious surface within the reach. No additional altered conditions are known to be present within this reach.

Siouxon Creek 2
This reach has 1.83 total stream miles under shoreline jurisdiction and 186.24 acres of shoreline jurisdictional area. All of this reach is designated as government services and is publicly owned. In terms of zoning, 65.1 percent of the reach is zoned forest and 34.9 percent as unzoned. There are no roads or impervious surface within the reach. No additional altered conditions are known to be present within this reach.

Siouxon Creek 3
This reach has 2.25 total stream miles under shoreline jurisdiction and 86.45 acres of shoreline jurisdictional area. All of this reach is designated as government services and is publicly owned. In terms of zoning, all of the reach is designated as unzoned. There are no roads or impervious surface within the reach. No additional altered conditions are known to be present within this reach.

Chinook Creek:
This reach has 1.90 total stream miles under shoreline jurisdiction and 128.65 acres of shoreline jurisdictional area. All of this reach is designated as government services and is publicly owned. In terms of zoning, all of the reach is designated as unzoned. There are no roads or impervious surface within the reach. No additional altered conditions are known to be present within this reach.

4.2.23.6 Public access
The subwatershed includes 17.03 miles of trails, which include Horseshoe Ridge Trail located southwest of Calamity Creek. There are no designated boat ramps, golf courses, or parks. The southern portion of Calamity Creek can be accessed from NF-318 and NF-57, while its northern portion is fairly inaccessible. With the exception of a small northeastern portion of Siouxin Creek #1 along an unnamed road, most of Siouxin Creek #1, Siouxin Creek #2, and Siouxin Creek #3 are fairly inaccessible. Most of Chinook Creek, with the exception of a small portion near Chinook Road, is inaccessible.

4.2.23.7 Restoration Opportunities
Ecological conditions within this subwatershed are generally in good condition, but some restoration opportunities within the watershed may include, but are not limited to: creating site channel/off channel habitat, in-channel improvements, wetland restoration, floodplain reconnection, and riparian preservation and restoration (Washington State Department of Ecology 2008a). Many of these actions may restore refugia, spawning habitat, invertebrate production, over-wintering habitat, wood and gravel recruitment, sediment sorting, bedform diversity, bed material retention, stream flow, channel and bank stability, hydraulic diversity, and nutrient input (Washington State Department of Ecology 2008a).

4.2.24 North Siouxon Creek (170800020403) – Map Sheet 3c

4.2.24.1 Overview

The North Siouxon Creek (170800020403) HUC is approximately 10,777.53 total acres, and includes 232.07 acres of shoreline jurisdictional area and 4.79 miles of streams under shoreline jurisdiction. Using WGS 84, the subwatershed's downstream location within Skamania County is 45.9808/-122.2460. This subwatershed is a tributary of the Middle Fork Lewis River and is located along the western boundary of Skamania County within primarily USFS land. The subwatershed borders Clark County to the east.

4.2.24.2 Reaches

North Siouxon Creek: This is the only reach located within the subwatershed. Its downstream location is 45.9808/-122.2460 and is upstream location is 46.0048/-122.1814. This reach is not a shoreline of statewide significance.

4.2.24.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-44.

Table 4-44. Surficial Geology and Soil Types - North Siouxon Creek (170800020403)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	83.33%
Alpine Glacial Drift, Fraser-Age	14.97%
Granodiorite, Basalt Flows, and Intrusive Andesite	Less than 1% each
Soil Types	
Zygore Gravelly Loam, 30 to 65% slopes	22.2%
Swift Cindery Sandy Loam, 30 to 65% slopes	11.2%
Vitric Haplocryands, Cind/Med	8.5%
Swift-Rock Outcrop Complex, 30 to 65% slopes	8.4%
Swift Cindery Sandy Loam, 2 to 30% slopes	6.9%
Typic Udivitrands, Pum, M, Frg	6.5%
Vanson-Rock Outcrop Complex, 65 to 90% slopes	5.8%
Vanson Sandy Loam, 65 to 90% slopes	5.5%
Aschoff Very Gravelly Loam, 30 to 65% slopes	4.4%
Hatchet-Rock Outcrop Complex, 65 to 90% slopes	4.1%
Swift-Rock Outcrop Complex, 65 to 90% slopes	2.9%
Zygore-Rock Outcrop Complex, 30 to 65% slopes	2.8%
Zygore Gravelly Loam, 5 to 30% slopes	2.8%
Typic Udivitrands, Cind/Med, Frg	1.9%
Aschoff Very Gravelly Loam, 5 to 30% slopes	1.5%
Aquolls, Fibrists, Aquods; Hatchet Gravelly Sandy Loam, 30 to 65% slopes; Hatchet, Cold-Rock Outcrop Complex, 30 to 65% slopes; Lithic Orthents, Andepts, Cryands, Udands; Rock Outcrop-Rubbleland Complex; Vanson Sandy Loam, 30 to 65% slopes; and Vanson Sandy Loam, 5 to 30% slopes	1% or less each

Vegetated cover within the subwatershed is composed of 83.41 percent forested woodland, 15.31 percent recently disturbed or modified land, 1.09 percent shrubland and/or grassland, and 0.19 percent developed other human use.

4.2.24.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater pond, elk, herbaceous bald, snag-rich areas, and talus slopes. The PHS species within the subwatershed include northern spotted owl and Cascade Torrent salamander. The monitored non-PHS species within the subwatershed is coastal tailed frog. No federally or state listed fish presence was identified in this subwatershed within Skamania County.

A total of 0.19 acres of freshwater pond NWI wetlands were identified within the subwatershed.

4.2.24.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 94.9 percent government servicesand 5.1 percent mining and extraction establishments. Approximately 94.9 percent of the subwatershed is publicly owned and 5.1 percent is privately owned. In terms of zoning, all of the watershed is designated forest.

The subwatershed has approximately 28.04 miles of roads and a road density of 1.66 miles per square mile. It has approximately 4,445,649 square feet of impervious road surfaces. No archaeological, cultural, or historical resources were identified within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

North Siouxon Creek. This reach has 4.79 total stream miles under shoreline jurisdiction and 232.07 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is designated forest. There are no designated roads within the reach or impervious cover. No additional altered conditions are known to be present within this reach.

4.2.24.6 Public Access

The subwatershed has 7.40 miles of trails and includes the North Siouxon Creek Trailhead and Mitchell Peak Trail. There are no designated boat launches, golf courses, or parks within the subwatershed. The subwatershed is located within USFS land and is relatively inaccessible. The S-2000 logging road is located further to the north.

4.2.24.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but some restoration opportunities within the watershed could include, but are not limited to: creating site channel/off channel habitat, in-channel improvements, wetland restoration, floodplain reconnection, and riparian preservation and restoration (Washington State Department of Ecology 2008a). Many of these actions may restore refugia, spawning habitat, invertebrate production, over-wintering habitat, wood and gravel recruitment, sediment sorting, bedform diversity, bed material retention, stream flow, channel and bank stability, hydraulic diversity, and nutrient input (Washington State Department of Ecology 2008a).

4.2.25 Lower Siouxon Creek (170800020404) – Map Sheets 3 and 3c

4.2.25.1 Overview

The Lower Siouxon Creek (180800020404) HUC is approximately 10,428.43 total acres, and includes 316.41 acres of shoreline jurisdictional area and 6.59 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location within Skamania County is 45.9622/-122.2459. Lower Siouxon Creek HUC is a subwatershed of the Middle Fork Lewis River, which is located in the west-central portion of Skamania County along the border with Clark County. The subwatershed is located within USFS land.

4.2.25.2 Reaches

Siouxon Creek Reach #4: From its confluence with Siouxon Creek Reach #3 of the Upper Siouxon Creek (170800020402) HUC to its confluence with West Creek and Siouxon Creek Reach #5. Its downstream location is 45.9488/-122.1757, and its upstream location is 45.9558/-122.1554. This reach is not a shoreline of statewide significance.

West Creek: From its confluence with Siouxon Creek Reach #4 and Siouxon Creek Reach #5. Its downstream location is 45.9488/-122.1757, and its upstream location is 45.9412/-122.1665. This reach is not a shoreline of statewide significance.

Siouxon Creek Reach #5: From its confluence with West Creek and Siouxon Creek Reach #4 to its confluence with Siouxon Creek, UT. Its downstream location is 45.9489/-122.2218, and its upstream location is 45.9493/-122.2217. This reach is not a shoreline of statewide significance.

Siouxon Creek, UT: From its confluence with Siouxon Creek Reach #5 and Siouxon Creek Reach #6. Its downstream location is 45.9489/-122.2218 and its upstream location is 45.9493/-122.2217. This reach is not a shoreline of statewide significance.

Siouxon Creek Reach 6: From its confluence with Siouxon Creek, UT to the border of Skamania County and Clark County. Its downstream location is 45.9622/-122.2459, and its upstream location is 45.9489/-122.2218. This reach is not a shoreline of statewide significance.

4.2.25.3 Physical Environment

Information about the surficial geology (i.e., lithology) and the soil types in the subwatershed is listed in Table 4-45.

Table 4-45. Surficial Geology and Soil Types - Lower Siouxon Creek (180800020404)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	93.11%
Mass-Wasting Deposits, Mostly Landslides	3.23%
Intrusive Andesite	2.49%
Alpine Glacial Drift, Fraser-Age	1.17%
Soil Types	
Andic Haplumbrepts, Med/Lo-Sk, M, Frg	40.9%
Andic Haplumbrepts, Med/C, M, Frg	17.3%
Zygore Gravelly Loam, 30 to 65% slopes	12.4%
Aschoff Very Gravelly Loam, 30 to 65% slopes	8.8%
Typic Udivitrands, Pum, M, Frg	5.4%
Lithic Orthents, Andepts, Cryands, Udands	4.0%
Aschoff Very Gravelly Loam, 5 to 30% slopes	3.7%
Andic Cryumbrepts, Med/Lo-Sk, M	3.4%
Andic Haplumbrepts, Med/Lo, M, Frg	1.1%
Aquic Hapludolls, Fine, Mont, M, Mes; Lithic Orthents Rock Outcrop-Rubbleland Complex; Typic Hapludands, Med, M, Mes; Zygore Gravelly Loam, 5 to 30% slopes	Less than 1% each

The subwatershed has approximately 336.98 acres of landslide hazard zones.

Vegetated cover within the subwatershed is composed of 93.37 percent forested woodland, 6.28 percent recently disturbed or modified land, 0.32 percent shrubland and/or grassland, and 0.02 percent developed other human use

4.2.25.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, elk habitat, herbaceous bald, snag-rich areas, and talus slopes. The PHS species within the subwatershed include northern spotted owl and the great blue heron. No federally or state listed fish presence was identified in this subwatershed within Skamania County.

A total of 3.61 acres of freshwater forested/shrub NWI wetlands were identified within the subwatershed.

4.2.25.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services. All of the subwatershed is publicly owned. In terms of zoning, the watershed is 63.9 percent classified as unzoned and 36.1 percent is forest.

The subwatershed has approximately 21.65 miles of roads and a road density of 1.33 miles per square mile. It has approximately 3,644,348 square feet of impervious road surface.

Known archaeological, cultural, or historical resources within the subwatershed include two archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within this subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Siouxon Creek Reach #4

This reach has 1.21 total stream miles under shoreline jurisdiction and 58.17 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 78.1 percent unzoned and 21.9 percent forest. There are no designated roads or impervious surfaces in this reach. This reach has a 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

West Creek

This reach has 0.72 total stream miles under shoreline jurisdiction and 35.13 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 100 percent unzoned. There are no designated roads or impervious surfaces in this reach. This reach has a 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Siouxon Creek Reach #5

This reach has 2.87 total stream miles under shoreline jurisdiction and 136.27 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 100 percent unzoned. There are no designated roads or impervious surfaces in this reach. This reach has a 303(d) listing associated with temperature. No additional altered conditions are known to be present within this reach.

Siouxon Creek Unnamed Tributary (Siouxon Creek, UT)

This reach has 0.03 total stream miles under shoreline jurisdiction and 2.0 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 100 percent unzoned. There are no designated roads or impervious surfaces

in this reach. No additional altered conditions are known to be present within this reach.

Siouxon Creek Reach #6
This reach has 1.77 total stream miles under shoreline jurisdiction and 84.83 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 52.2 percent forest and 47.8 percent unzoned. There are no designated roads or impervious surfaces in this reach. No additional altered conditions are known to be present within this reach.

4.2.25.6 Public Access
The subwatershed has 9.98 miles of trails. There are no designated boat ramps, golf courses, or parks. The subwatershed is located within USFS land and is relatively inaccessible. The S-1000 logging road is located further to the northeast.

4.2.25.7 Restoration Opportunities
Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Some restoration opportunities within the watershed could include, but are not limited to: creating site channel/off-channel habitat, in-channel improvements, wetland restoration, floodplain reconnection, and riparian preservation and restoration (Washington State Department of Ecology 2008a). Many of these actions may help restore refugia, spawning habitat, invertebrate production, over-wintering habitat, wood and gravel recruitment, sediment sorting, bedform diversity, bed material retention, stream flow, channel and bank stability, hydraulic diversity, and nutrient input (Washington State Department of Ecology 2008a).

4.2.26 Headwaters East Fork Lewis River (170800020501) – Map Sheet 5

4.2.26.1 Overview
The Headwaters East Fork Lewis River (17800020501) HUC is approximately 9,584.49 total acres and includes 85 acres of shoreline jurisdictional area and 1.52 miles of streams under shoreline jurisdiction. Using WGS 84, the subwatershed's downstream location is 45.8229/-122.1635. This subwatershed includes the headwaters of the East Fork Lewis River in the southwestern portion of Skamania County. The subwatershed is located upstream of Slide Creek-East Fork Lewis River (170900020502).

4.2.26.2 Reaches
East Fork Lewis River, Green Fork (Lewis River, E F, Green F) is the only reach located in the subwatershed. Its downstream location is 45.8229/-122.1635 and its upstream location is 45.8349/-122.1424. This reach is not a shoreline of statewide significance.

4.2.26.3 Physical Environment

The surficial geology (i.e., lithology) and soil types of the subwatershed are listed in Table 4-46.

Table 4-46. Surficial Geology and Soil Types - Headwaters East Fork Lewis River (170800020501)

Type	Percent
Surficial Geology	
Volcanisclastic Deposits or Rocks	87.21%
Glacial Drift, Undivided	10.36%
Diorite	1.23%
Intrusive Andesite	0.83%
Quartz Diorite	0.36%
Soil Types	
Andic Haplumbrepts (MED/LO-SK, M, FRG)	69.1%
Andic Cryumbrepts (MED/LO-SK, M)	22.3%
Andic Haplumbrepts (MED/C, M, FRG)	2.9%
Andic Haplumbrepts (MED/LO, M, FRG)	2.3%
Lithic Orthents, Andepts, Cryands, Udands	1.9%
Lithic Andic Cryumbrepts (MED/LO-SK, M), Vitric Haplocryands (CIND/MED), Lithic Orthents, Aquolls, Fibrists, Aquods, Typic Udorthents (ASH/LO-SK, M, FRG), and N/A Soils	Less than 1% each

Vegetated cover within the subwatershed is composed of 72.51 percent forested woodland, 17.53 percent recently disturbed or modified land, 9.58 percent shrubland and/or grassland, and 0.38 percent developed or other human use.

4.2.26.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater pond, herbaceous bald, snag-rich areas, and talus slopes. The PHS species within the subwatershed include northern spotted owl and northern goshawk.

Approximately 8.94 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. In freshwater, this species prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a). Approximately 6.21 stream miles of East Fork Lewis summer steelhead habitat is found within the watershed. Stream habitats with deep low-velocity pools are important habitat for this species (NOAA Fisheries 2015).

A total of 62.2 acres of NWI wetlands was identified within the subwatershed. These wetlands include 95.62 percent freshwater forested/shrub wetlands and 4.38 percent freshwater pond.

4.2.26.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, all of the watershed is unzoned.

The subwatershed has approximately 33.45 miles of roads and a road density of 2.23 miles per square mile. The subwatershed has approximately 5,263,766 square feet of impervious road surfaces.

Known archeological, cultural, or historical resources within the subwatershed include 37 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within this subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the four 303(d) listings associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

East Fork Lewis River, Green Fork (Lewis River, E F, Green F) Reach: This reach has a total of 1.52 stream miles and 85 acres of jurisdictional area. The only existing land use within reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is unzoned. There are approximately 1.56 miles of roads and approximately 273,439 square feet of impervious road surfaces in this reach. There are two 303d listings within this reach for temperature. No additional altered conditions are known to be present within this reach.

4.2.26.6 Public Access

The subwatershed has 3.51 miles of trails. There are no designated boat launches, golf courses, or parks within the subwatershed. The subwatershed is located on USFS land and can be accessed from NF-42.

4.2.26.7 Restoration Opportunities

Headwaters East Fork Lewis River is located within the East Fork Lewis subbasin, which has been identified as critical to salmon recovery (Lower Columbia Fish Recovery Board 2010). Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Restoration opportunities within the watershed may include, but are not limited to, protecting intact forest in headwater basins; restoring lowland floodplain function, riparian function, and stream habitat diversity; managing forest lands to restore and protect watershed processes; restoring fish passage at culverts or other barriers; managing growth and development to protect watershed processing and habitat conditions; and aligning hatchery priorities with conservation objectives (USFS 2016b, Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.27 Slide Creek-East Fork Lewis River (170800020502) – Map Sheet 5

4.2.27.1 Overview

The Slide Creek-East Fork Lewis River (170800020502) HUC is approximately 9,672.89 total acres with 333.33 acres of shoreline jurisdictional area and 6.78 miles of streams under shoreline jurisdiction within Skamania County. This subwatershed has seven reaches. Using WGS 84, the subwatershed's downstream location in the County is approximately 45.8283/-122.1840, and its upstream location is approximately 45.8273/-122.2242. This subwatershed is a tributary of the East Fork Lewis River and is located along the western boundary of Skamania County. The subwatershed borders Clark County to the west.

4.2.27.2 Reaches

Lewis River East Fork (Lewis River E F) #1: From the confluence with East Fork Lewis River, Green Fork (Lewis River E F, Green F) to Little Creek. Its downstream location is 45.8283/-122.1840, and its upstream location is 45.8229/-122.1635. This reach is not a shoreline of statewide significance.

Lewis River East Fork (Lewis River E F) #2: From the confluence of Little Creek to McKinley Creek. Its downstream location is 45.8242/-122.2008, and its upstream location is 45.8283/-122.1840. This reach is not a shoreline of statewide significance.

McKinley Creek: From its confluence with Lewis River E F #2 and Lewis River E F #3. Its downstream location is 45.8242/-122.2008 and its upstream location is 45.8237/ 122.2004. This reach is not a shoreline of statewide significance.

Lewis River East Fork (Lewis River E F) #3: From the confluence of McKinley Creek to Slide Creek. Its downstream location is 45.8273/-122.2242, and its upstream location is 45.8242/-122.2008. This reach is not a shoreline of statewide significance.

Lewis River East Fork (Lewis River E F) #4: From the confluence of Slide Creek to the western border of Skamania County. Its downstream location is 45.8185/ 122.2498, and its upstream location is 45.8273/-122.2242. This reach is not a shoreline of statewide significance.

Little Creek: From its confluence with Lewis River E F #1 and Lewis River E F #2. Its downstream location is 45.8283/-122.1840, and its upstream location is 45.8323/-122.1810. This reach is not a shoreline of statewide significance.

Slide Creek: From its confluence with Lewis River E F #3 and Lewis River E F #4. Its downstream location is 45.8273/-122.2242, and its upstream location is 45.8424/-122.2285. This reach is not a shoreline of statewide significance.

4.2.27.3 Physical Environment

The surficial geology (i.e., lithology) and soil types of the subwatershed are listed in Table 4-47.

Table 4-47. Surficial Geology and Soil Types - Slide Creek – East Fork Lewis River (170800020502)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits Or Rocks	72.74%
Andesite Flows	14.98%
Quartz Diorite	9.58%
Intrusive Andesite	1.72%
Diorite	Less than 1%
Soil Types	
Andic Haplumbrepts (MED/LO-SK, M, FRG)	70.1 percent
Andic Haplumbrepts (MED/C, M, FRG)	17.8%
Andic Cryumbrepts (MED/LO-SK, M)	5.8%
Aquic Hapludolls (FINE, MONT, M, MES)	2.7%
Lithic Orthents, Andepts, Cryands, Udands	1.8%
Andic Haplumbrepts (MED/LO, M, FRG)	1.5%
Lithic Andic Cryumbrepts (MED/LO-SK, M), Lithic Orthents, and N/A Soils	Less than 1% each

Vegetated cover within the subwatershed is composed of 0.8 percent developed and other human use, 79.65 percent forested woodland, 9.61 percent recently disturbed or modified land, and 10.65 percent shrubland and/or grassland.

4.2.27.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, biodiversity areas and corridor, cliffs/bluffs, herbaceous bald, snag-rich areas, talus slopes. The only PHS species within the subwatershed is the northern spotted owl.

Approximately 10.24 stream miles of Lewis coastal cutthroat and 7.89 miles of East Fork Lewis summer steelhead are found within the subwatershed. In freshwater, the coastal cutthroat prefers deeper pools and cover that can be provided by large woody debris (Washington Department of Fish and Wildlife 2015a). East Fort Lewis summer steelhead prefer habitats with deep low-velocity pools (NOAA Fisheries 2015).

A total of 95.51 acres of NWI wetlands were identified within the subwatershed. All of these wetlands are freshwater forested/shrub wetlands.

4.2.27.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, all of the watershed is classified as unzoned. The subwatershed has approximately 45.99 miles of roads and a road density of 3.04 miles per square mile. The subwatershed has approximately 7,239,705 square feet of impervious road surfaces.

Known archeological, cultural, or historical resources within the subwatershed include 24 archeological sites.

The subwatershed has two wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the four 303(d) listings associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Lewis River East Fork (Lewis River E F) #1:
This reach has 1.21 total stream miles under shoreline jurisdiction and 58.56 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, all of the reach is unzoned. There are approximately 1.2 miles of roads within the reach. It has approximately 185,472.93 square feet of impervious road surfaces. There is a 303d listing within this reach for temperature. No additional altered conditions are known to be present within this reach.

Lewis River East Fork (Lewis River E F) #2:
This reach has 1.05 total stream miles under shoreline jurisdiction and 50.21 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, all of the reach is classified as unzoned. There are approximately 0.38 miles of roads within the reach and it has approximately 60,624.86 square feet of impervious road surfaces. There is a 303d listing within this reach for temperature. No additional altered conditions are known to be present within this reach.

McKinley Creek:
This reach has 0.04 total stream miles under shoreline jurisdiction and 2.43 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, all of the reach is classified as unzoned. There is no impervious area within the reach. No additional altered conditions are known to be present within this reach.

Lewis River East Fork (Lewis River E F) #3:
This reach has 1.45 total stream miles under shoreline jurisdiction and 74.91 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, all of the reach is classified as unzoned. There are approximately 1.25 miles of roads within the reach. It has approximately 195,400.20 square feet of impervious road surfaces. There is a 303d listing within this reach for temperature. No additional altered conditions are known to be present within this reach.

Lewis River East Fork (Lewis River E F) #4:
This reach has 1.55 total stream miles under shoreline jurisdiction and 76.35 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, all of the reach is classified as unzoned. There are approximately 0.96 miles of roads within the reach. It has approximately 151,023.81 square feet of impervious road surfaces. There is a wellhead protection area within this reach. There is a 303d listing adjacent to this reach for temperature. No additional altered conditions are known to be present within this reach.

Little Creek:
This reach has 0.35 total stream miles under shoreline jurisdiction and 17.36 acres of shoreline jurisdictional area. The only existing land use within this reach is government services and all of the reach is publicly owned. In terms of zoning, all of the reach is classified as unzoned. There are approximately 0.03 miles of roads within the reach. It has approximately 5,291.06 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Slide Creek:
This reach has 1.16 total stream miles under shoreline jurisdiction and 55.95 acres of shoreline jurisdictional area. The only existing land use within this reach is government servicesand all of the reach is publicly owned. In terms of zoning, all of the reach is classified as unzoned. There are approximately 0.12 miles of roads within the reach. It has approximately 19,679.12 square feet of impervious road surfaces. There is a 303d listing adjacent to this reach for temperature. No additional altered conditions are known to be present within this reach.

4.2.27.6 Public Access
The subwatershed has 2.64 miles of trails. There are no designated boat launches or parks within the subwatershed. The subwatershed is located within USFS land and most of Lewis River East Fork reaches #1 – 4 can be accessed from NF-42. McKinley Creek can be accessed from the north by NF-42 and in the southeast by NF-504. However, it is difficult to access much of the central section of McKinley Creek. Slide Creek can be accessed on the western side from NF-4205 and from NF-4207 on its eastern side. The downstream portion of Little Creek is relatively accessible from NF-42, while its upstream portions are difficult to access except from an unnamed road to the northeast.

4.2.27.7 Restoration Opportunities
Slide Creek-East Fork Lewis River is located within the East Fork Lewis subbasin, which has been identified as critical to salmon recovery (Lower Columbia Fish Recovery Board 2010). Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature within the subwatershed. Some restoration opportunities within the watershed

could include, but are not limited to: protecting intact forest in headwater basins; restoring lowland floodplain function, riparian function, and stream habitat diversity; managing forest lands to restore and protect watershed processes; managing growth and development to protect watershed processing and habitat conditions; restoring fish passage at culverts or other barriers; and aligning hatchery priorities with conservation objectives (USFS 2016b, Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.28 Copper Creek (170800020503) – Map Sheets 5 and 5b

4.2.28.1 Overview

The Copper Creek (170800020503) HUC has approximately 8,973 total acres, 174 acres of shoreline jurisdictional area, and 3.46 miles of streams under shoreline jurisdiction within Skamania County. According to WGS 84, the subwatershed's downstream location within Skamania County is 45.8046/-122.2495. Copper Creek is a tributary of the East Fork Lewis River, and is located in the southwestern portion of Skamania County. The subwatershed partially borders Clark County to the west.

4.2.28.2 Reaches

The Copper Creek reach is the only reach within the subwatershed. This reach is not a shoreline of statewide significance.

4.2.28.3 Physical Environment

The surficial geology (i.e., lithology) and soil types of the subwatershed are listed in Table 4-48.

Table 4-48. Surficial Geology and Soil Types - Copper Creek (170800020503)

Type	Percent
Surficial Geology	
Andesite Flows	48.16%
Granodiorite	40.73%
Volcaniclastic Deposits or Rocks	3.43%
Quartz Diorite	2.84%
Diorite	2.53%
Granite	2.07%
Intrusive Granodiorite	Less than 1%
Soil Types	
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	53.5%
Andic Haplumbrepts (MED/C, M, FRG)	14.9%
Lithic Orthents, Andepts, Cryands, Udands	13.8%
Andic Haplumbrepts (MED/LO-SK, M)	13.0%
Lithic Orthents, Andic Haplumbrepts (MED/LO, M, FRG)	3.9%
Andic Haplumbrepts (MED/LO, M, FRG), Aquic Hapludolls (FINE, MONT, M, MES), and N/A Soils	Less than 1% each

Vegetated cover within the subwatershed is composed of 60.48 percent forested woodland, 32.14 percent shrubland and/or grassland, 5.39 percent recently disturbed

or modified land, 1.83 percent non-vascular and sparse vascular rock vegetation, 0.11 percent agricultural land, and 0.05 percent developed or other human use.

4.2.28.4 Biological Resources

The types of PHS priority habitat within the subwatershed include freshwater forested/shrub wetland, cliffs/bluffs, herbaceous bald, and talus slopes. The PHS species within the subwatershed include northern spotted owl, golden eagle, gray wolf, Larch Mountain salamander, and Cascade Torrent salamander. The only monitored non-PHS species within the watershed is the coastal tailed frog. Approximately 9.96 stream miles of Lewis coastal cutthroat habitat, which includes 3.46 miles of streams under shoreline jurisdiction, are found within the subwatershed. In freshwater habitat, this species prefers deep pools and cover that can be provided by large woody debris (U.S. Fish and Wildlife Service 2015a).

A total of 68.86 acres of NWI wetlands was identified within the subwatershed. All of these wetlands are freshwater forested/shrub wetlands.

4.2.28.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, almost all of the watershed is designated as unzoned, with only 0.23 acres designated as forest.

The subwatershed has approximately 30.14 miles of roads and a road density of 2.15 miles per square mile. The subwatershed has approximately 4,737,821 square feet of impervious road surfaces.

Known archeological, cultural, or historical resources within the subwatershed include 31 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within this subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the watershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Copper Creek Reach

The only existing land use within the Copper Creek reach is government services, and all of the subwatershed is publicly owned. In terms of zoning, all of the reach is designated as unzoned. There are approximately 2.17 miles of roads within the reach jurisdiction and it has approximately 240,670.41 square feet of impervious road surfaces. This reach has a State 303d listing associated with temperature. No additional altered conditions are known to be present within this reach.

4.2.28.6 Public Access

The subwatershed has approximately 9.45 miles of trails. There are no boat launches, golf courses, or parks within the subwatershed. The subwatershed is located on USFS land and can be accessed from NF-41.

4.2.28.7 Restoration Opportunities

Copper Creek is located within the East Fork Lewis subbasin, which has been identified as critical to salmon recovery (Lower Columbia Fish Recovery Board 2010). Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the watershed. Some restoration opportunities within the watershed could include, but are not limited to, protecting intact forest in headwater basins; restoring lowland floodplain function, riparian function, and stream habitat diversity; managing forest lands to restore and protect watershed processes; managing growth and development to protect watershed processing and habitat conditions; restoring fish passage at culverts or other barriers; and aligning hatchery priorities with conservation objectives (USFS 2016b, Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.29 Coyote Creek (170800020504) – Map Sheet 5b

4.2.29.1 Overview

The Coyote Creek (170800020504) HUC has approximately 379.40 total acres, and does not include any waterbodies that meet the criteria for shoreline jurisdiction in Skamania County. Using WGS 84, the subwatershed is located at approximately 45.7700/-122.2480. It is located within the East Fork Lewis River watershed between the Copper Creek subwatershed and the border between Skamania County and Clark County.

4.2.29.2 Reaches

There are no stream reaches that meet shoreline jurisdiction criteria within the subwatershed.

4.2.29.3 Physical Environment

The subwatershed's surficial geology (i.e., lithology) and its soil types are listed in

Table 4-49.

Table 4-49. Surficial Geology and Soil Types - Coyote Creek (170800020504)

Type	Percent
Surficial Geology	
Andesite Flows	99.75%
Quartz Diorite	Less than 1%
Soil Types	
Andic Cryumbrepts (Med/LO-SK, M)	83.%
Lithic Orthents, Andepts, Cryands, Udands	13.8%
Andic Haplumbrepts (MED/LO-SK, M, FRG)	2.1%
Lithic Orthents.	1.1%

Vegetated cover within the subwatershed is composed of 62.29 percent forested woodland and 37.71 percent shrubland and/or grassland.

4.2.29.4 Biological Resources

The only type of PHS priority habitat within the subwatershed is herbaceous bald. No PHS species are listed in the subwatershed within Skamania County. Approximately 0.11 stream miles of Lewis coastal cutthroat trout habitat is found within the subwatershed. In freshwater, this species prefers deep pools and cover that can be provided by large woody debris (U.S. Fish and Wildlife Service 2011b). No NWI wetlands were identified within the subwatershed.

4.2.29.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services and all of the subwatershed is publicly owned. In terms of zoning, all of the watershed is unzoned.

The subwatershed has approximately 0.87 miles of roads and a road density of 1.46 miles per square mile. The subwatershed has approximately 136,768 square feet of impervious road surfaces. Known archeological, cultural, or historical resources within the subwatershed include six archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

4.2.29.6 Public Access

The subwatershed has 2.96 miles of trails. There are no designated boat ramps, golf courses, or parks within the subwatershed. The subwatershed is located within USFS land. Portions of the subwatershed are accessible from NF-4109.

4.2.29.7 Restoration Opportunities

Coyote Creek is located within the East Fork Lewis subbasin, which has been identified as critical to salmon recovery (Lower Columbia Fish Recovery Board 2010). Ecological conditions within this subwatershed are generally in good condition, but some restoration opportunities within the watershed could include, but are not limited to: protecting intact forest in headwater basins; restoring lowland

floodplain function, riparian function, and stream habitat diversity; managing forest lands to restore and protect watershed processes; managing growth and development to protect watershed processing and habitat conditions; restoring fish passage at culverts or other barriers; and aligning hatchery priorities with conservation objectives (USFS 2016b, Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.30 Upper Canyon Creek (170800020601) – Map Sheet 3

4.2.30.1 Overview

The Upper Canyon Creek (170800020601) HUC is approximately 14,855 total acres, and includes 650.51 acres of shoreline jurisdictional area and 7.03 miles of streams under shoreline jurisdiction. Using WGS 84, the subwatershed's downstream location is approximately 45.9040/-122.1763. This subwatershed is part of the Lower Lewis River subwatershed and flows toward Lower Canyon Creek in the west-central portion of Skamania County.

4.2.30.2 Reaches

Puny Creek: From its headwaters to its confluence with Canyon Creek #1. Its downstream location is 45.8893/-122.1356, and its upstream location is 49.9007/-122.0924. This reach is not a shoreline of statewide significance.

Jakes Creek: From its confluence with Canyon Creek #1 and Canyon Creek #2. Its downstream location is 49.9009/-122.1717, and its upstream location is 45.8824/ 122.1726. This reach is not a shoreline of statewide significance.

Canyon Creek #1: From its confluence with Puny Creek to its confluence with Canyon Creek #2 and Jakes Creek. Its downstream location is 45.9009/-122.1717, and its upstream location is 45.8893/-122.1356. This reach is not a shoreline of statewide significance.

Canyon Creek #2: From its confluence with Canyon Creek #1 and Jakes Creek to its confluence with Sorehead Creek. Its downstream location is 45.9040/-122.1763, and its upstream location is 45.9009/-122.1717. This reach is not a shoreline of statewide significance.

Sorehead Creek: From its headwaters to its confluence with Canyon Creek #2. Its downstream location is 45.9040/-122.1763, and its upstream location is 45.9107/-122.1682. This reach is not a shoreline of statewide significance.

4.2.30.3 Physical Environment

The surficial geology (i.e., lithology) and soil types found in the subwatershed are listed in

Table 4-50.

Table 4-50. Surficial Geology and Soil Types - Upper Canyon Creek (170800020601)

Type	Percent
Surficial Geology	
Volcaniclastic Rocks	86.29%
Intrusive Andesite	3.75%
Andesite Flows	3.73%
Diorite	1.91%
Basaltic Andesite Flows	1.38%
Basalt Flows	1.12%
Alpine Glacial Drift (Fraser-Age), Alluvium, and Tuffs and Tuff Breccias	Less than 1% of each
Soil Types	
Andic Haplumbrepts (MED/LO-SK, M, FRG)	56.7%
Andic Cryumbrepts (MED/LO-SK, M)	32.4%
Lithic Orthents, Andepts, Cryands, Udands	5.7%
N/A Soils	2.5%
Andic Haplumbrepts (MED/LO, M, FRG)	1.1%
Typic Udivitrands (PUM/S-SK, FRG), Andic Haplumbrepts (MED/C, M, FRG), Aquic Vitricryands (ASHY/MED-SK), and Aquolls, Fibrists, Aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 67.92 percent forested woodland, 31.39 percent recently disturbed or modified land, 0.66 percent developed other human use, 0.01 percent open water, and 0.01 percent shrubland and/or grassland.

4.2.30.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetlands, freshwater ponds, caves or cave-rich areas, elk habitat, herbaceous bald, snag-rich areas, and talus slopes.

The PHS species within the subwatershed include northern spotted owl, Larch Mountain salamander, and the coastal tailed salamander. The only monitored non-PHS species within the subwatershed is the coastal tailed frog.

Approximately 11.23 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed. In freshwater habitat, this species prefers deep pools and cover, which can be provided by large woody debris (U.S. Fish and Wildlife Service 2011b).

A total of 19.35 acres of NWI wetlands was identified within the subwatershed. These wetlands include 72.73 percent freshwater emergent wetlands and 27.27 percent freshwater ponds.

4.2.30.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, all of the watershed is classified unzoned.

The subwatershed has approximately 103.05 miles of roads and a road density of 4.44 miles per square mile. The subwatershed has approximately 16,277,362 square feet of impervious road surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include eight archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Puny Creek

This reach has 2.54 total stream miles under shoreline jurisdiction and 333.55 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is designated unzoned. There are approximately 1.15 miles of roads within the reach, resulting in approximately 181,164.89 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Jakes Creek

This reach has 1.37 total stream miles under shoreline jurisdiction and 46.84 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is designated unzoned. There are approximately 0.11 miles of roads within the reach, resulting in 17,013.93 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Canyon Creek #1

This reach has 2.07 total stream miles under shoreline jurisdiction and 41.68 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is designated unzoned. There are approximately 0.16 miles of roads within the reach, resulting in 28,284.37 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Canyon Creek #2

This reach has 0.37 total stream miles under shoreline jurisdiction and 80.14 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is designated unzoned. There are approximately 0.08 miles of roads in the

reach, resulting in 13,278.91 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Sorehead Creek

This reach has 0.69 total stream miles under shoreline jurisdiction and 148.30 acres of shoreline jurisdictional area. The only existing land use in this reach is government services, and approximately 100 percent of the reach is publicly owned. In terms of zoning, all of the reach is designated unzoned. There are approximately 0.13 miles of roads, resulting in approximately 20,474.01 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

4.2.30.6 Public Access

There are no designated trails, boat launches, golf courses, or parks within the subwatershed. The subwatershed is located within U.S. Forest Service land. Puny Creek and Sorehead Creek can be accessed by NF-54. Jake's Creek can be accessed from the west by NF-527, from east by NF-526, and from the north by NF-37. Access to the southern portion of Jakes Creek is difficult. Most of Canyon Creek #1 and Canyon #2 can be accessed from the south by NF-38.

4.2.30.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but potential restoration opportunities within the watershed could include, but are not limited to: protecting intact forest in headwater basins; restoring lowland floodplain function, riparian function, and stream habitat diversity; managing forest lands to restore and protect watershed processes; managing growth and development to protect watershed processing and habitat conditions; and restoring fish passage at culverts or other barriers (USFS 2016b, Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.31 Fly Creek (170800020602) – Map Sheets 3 and 5

4.2.31.1 Overview

The Fly Creek (170800020602) HUC is approximately 983.71 total acres within Skamania County, and does not include any waterbodies that meet shoreline jurisdiction criteria. Using WGS 84, the subwatershed's downstream location is at approximately 45.8700/-122.2453. It is located within the Lower Lewis River watershed along the western border of Skamania County with Clark County.

4.2.31.2 Reaches

There are no stream reaches that meet shoreline jurisdiction criteria within the subwatershed.

4.2.31.3 Physical Environment

The surficial geology (i.e., lithology) and soil types in the subwatershed are listed in Table 4-51.

Table 4-51. Surficial Geology and Soil Types - Fly Creek (170800020602)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	51.03%
Alpine Glacial Drift (Pre-Fraser)	30.74%
Intrusive Andesite	14.05%
Andesite Flows	4.17%
Soil Types	
Andic Haplumbrepts, MED/LO-SK, M, FRG	67.8%
Andic Haplumbrepts, MED/C, M, FRG	22.7%
Andic Haplumbrepts, MED/LO, M, FRG	6.0%
Andic Cryumbrepts, MED/LO-SK, M	2.7%
Lithic Orthents and N/A Soils	Less than 1% each

Vegetated cover within the subwatershed is composed of 83.91 percent forested woodland, 15.96 percent recently disturbed or modified land, and 0.14 percent developed other human use.

4.2.31.4 Biological Resources

The PHS priority habitat type within the subwatershed are freshwater forested/shrub wetlands and snag-rich areas. The only PHS species within the subwatershed is the northern spotted owl. No federally or state listed fish presence was identified in this subwatershed within Skamania County.

A total of 2.28 acres of NWI wetlands were identified within the subwatershed. All were freshwater forested/shrub wetlands.

4.2.31.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, all of the watershed is classified unzoned.

The subwatershed has approximately 9.77 miles of roads and a road density of 6.36 miles per square mile. The subwatershed has approximately 1,536,849 square feet of impervious road surfaces.

Only one archaeological, cultural, or historical resource is known within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

4.2.31.6 Public Access

There are no designated trails, boat launches, golf courses, or parks within the subwatershed. The subwatershed is located on U.S. Forest Service land and, with the

exception of some access around its perimeter from NF-520, NF-521, and Gumboot Road/NF-4205, the subwatershed is relatively inaccessible.

4.2.31.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but some restoration opportunities within the watershed could include, but are not limited to, protecting intact forest in headwater basins; restoring lowland floodplain function, riparian function, and stream habitat diversity; managing forest lands to restore and protect watershed processes; managing growth and development to protect watershed processing and habitat conditions; and restoring fish passage at culverts or other barriers (USFS 2016b, Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.32 Lower Canyon Creek (170800020603) – Map Sheet 3

4.2.32.1 Overview

The Lower Canyon Creek (17080020603) HUC is approximately 8,782.22 total acres, and includes 1,315.58 acres of shoreline jurisdictional area and 8.26 miles of streams under shoreline jurisdiction within Skamania County. Using WGS 84, the subwatershed's downstream location within Skamania County is approximately 45.9289/-122.2453, and its upstream location is approximately 45.9040/-122.1763. The Lower Canyon Creek HUC is a subwatershed of the Lower Lewis River, which is located in the southwestern portion of Skamania County. The subwatershed borders Clark County to the west.

4.2.32.2 Reaches

Big Rock Creek: From its headwaters to the border of Skamania County and Clark County. Its downstream location is 45.9289/-122.2453, and its upstream location is 45.8922/-122.2138. This reach is not a shoreline of statewide significance.

Canyon Creek #3: From its confluence with Canyon Creek #2 to the border of Skamania County and Clark County. Its downstream location is 45.9306/-122.2454, and its upstream location is 45.9040/-122.1763. This reach is not a shoreline of statewide significance.

4.2.32.3 Physical Environment

The surficial geology (i.e., lithology) and soil types of the subwatershed are listed in

Table 4-52.

Table 4-52. Surficial Geology and Soil Types - Lower Canyon Creek (170800020603)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	76.99%
Intrusive Andesite	22.72%
Diorite	0.29%
Soil Types	
Andic Haplumbrepts, MED/LO-SK, M, FRG	48.7%
Andic Haplumbrepts, MED/C, M, FRG	45.9%
Andic Cryumbrepts, MED/LO-SK, M	2.2%
Andic Haplumbrepts, MED/LO, M, FRG	1.7%
Lithic orthents, andepts, cryands, udands	1.0%
Aquolls, fibrists, aquods, Typic udivitrands, PUM/S-SK, FRG, and N/A Soils	Less than 1% each

Vegetated cover within the subwatershed is composed of 74.76 percent forested woodland, 25.12 percent recently disturbed or modified land, and 0.12 percent developed/other human use.

4.2.32.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetlands, herbaceous bald, and talus slopes. The PHS species within the subwatershed include northern spotted owl and the Larch Mountain salamander. Approximately 9.87 stream miles of Lewis coastal cutthroat trout habitat is found within the subwatershed. In terms of freshwater habitat, this species prefers deep pools and the cover that can be provided by large woody debris (U.S. Fish and Wildlife Service 2011b).

A total of 1.86 acres of NWI wetlands was identified within the subwatershed. All of these wetlands are freshwater forested/shrub wetlands.

4.2.32.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, all of the watershed is designated unzoned.

The subwatershed has approximately 62.27 miles of roads with a road density of 4.54 miles per square mile. The subwatershed has approximately 10,323,433 square feet of impervious road surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include six archaeological sites. The subwatershed has one wellhead protection area. No State 303d water quality issues have been identified within this subwatershed.

Big Rock Creek: This reach has 3.64 total stream miles under shoreline jurisdiction and 59.28 acres of shoreline jurisdictional area. The only existing land use within this

reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is classified unzoned. There are no designated roads or impervious surfaces within the reach. No additional altered conditions are known to be present within this reach.

Canyon Creek #3: This reach has 4.62 total stream miles under shoreline jurisdiction and 1,256.29 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. In terms of zoning, all of the reach is classified unzoned. There are approximately 1.15 miles of roads within the reach with approximately 202,580 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

4.2.32.6 Public Access

The subwatershed is located on USFS land and has no designated trails, boat ramps, or golf courses. The Canyon Creek Campground is located adjacent to Canyon Creek Reach #3, which can be accessed from the north by NF-54 and from the south by NF-37. The Big Rock Creek reach can be accessed from NF-5301, NF-537, and NF-520.

4.2.32.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but some restoration opportunities within the watershed could include, but are not limited to, protecting intact forest in headwater basins; restoring lowland floodplain function, riparian function, and stream habitat diversity; managing forest lands to restore and protect watershed processes; managing growth and development to protect watershed processing and habitat conditions; and restoring fish passage at culverts or other barriers (USFS 2016b, Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.2.33 Headwaters Kalama River (170800030301) – Map Sheet 1

4.2.33.1 Overview

The Headwaters Kalama River (170800030301) HUC is approximately 2,974.22 total acres in size, and includes 18.05 acres of shoreline jurisdictional area and 0.34 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 46.1536/-122.2461. The Headwaters Kalama River is a subwatershed of the Kalama River subbasin, and is located on the southwestern flanks of Mount Saint Helens National Volcanic Monument. The subwatershed borders Clark County to the west.

4.2.33.2 Reaches

The Dryer Glacier reach is the only reach within the subwatershed. It flows in a southwesterly direction to the County boundary. Its downstream location is 46.1536/-122.2461, and its upstream location is 46.1552/-122.2394. This reach is not a shoreline of statewide significance.

4.2.33.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-53.

Table 4-53. Surficial Geology and Soil Types - Headwaters Kalama River (170800030301)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	46.12%
Andesite Flows	22.14%
Basalt Flows	15.01%
Intrusive Andesite and Dacite	9.59%
Lahars	5.88%
Ice; Volcanic Rocks	Less than 1% each
Soil Types	
Rock outcrop-Rubbleland complex	35.8%
Lithic Umbric Vitrandepts, 0 to 15% slopes	35.6%
Hatchet, cold-Rock outcrop complex, 65 to 90% slopes	8.4%
Polepatch extremely bouldery loamy sand, 0 to 30% slopes	6.5%
Obscurity very bouldery sand, 0 to 30% slopes	4.9%
Vanson-Rock outcrop complex, 65 to 90% slopes	4.0%
Vanson sandy loam, 5 to 30% slopes	1.4%
Hatchet gravelly sandy loam, cold, 30 to 65% slopes	1.2%
Studebaker very gravelly loamy sand, 0 to 20% slopes	1.2%
Lonestar cindery sandy loam, 5 to 30% slopes; Vanson sandy loam, 30 to 65% slopes; Lithic Andic Cryumbrepts (MED/LO-SK, M); Typic Udivitrands (PUM, M, FRG); Vitrandic Udorthents (S-SK, M, FRG); Vitric Haplocryands (CIND/MED)	Less than 1% each

Vegetated cover within the subwatershed is composed of, 62.12 percent forested woodland, 33.22 percent nonvascular or sparse vascular rock vegetation, 5.28 percent recently disturbed or modified land, 0.21 percent high montane vegetation, 0.10 percent developed other human use, and 0.07 percent shrubland and/or grassland.

4.2.33.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetlands and freshwater emergent wetland. There are no PHS species or monitored non-PHS species within the subwatershed. Approximately 1.93 stream miles of Kalama coastal cutthroat habitat are found within the subwatershed. In freshwater habitat, this species prefers deep pools and cover that can be provided by large woody debris (U.S. Fish and Wildlife Service 2011b).

A total of 9.20 acres of NWI wetlands were identified within the subwatershed. These wetlands include 88.06 percent freshwater forested/shrub wetland and 11.94 percent freshwater emergent wetland.

4.2.33.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services. All of the subwatershed is publicly owned and it is entirely unzoned. The subwatershed has approximately 0.85 miles of roads with a road density of 0.18 miles per square mile. The subwatershed has approximately 163,089 square feet of impervious road surfaces. Known archaeological, cultural, or historical resources within the subwatershed include one archeological site.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Dryer Glacier

This reach has 0.34 total stream miles under shoreline jurisdiction and 18.05 acres of shoreline jurisdictional area. All of the existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no designated roads or impervious surfaces within the reach. No additional altered conditions are known to be present within this reach.

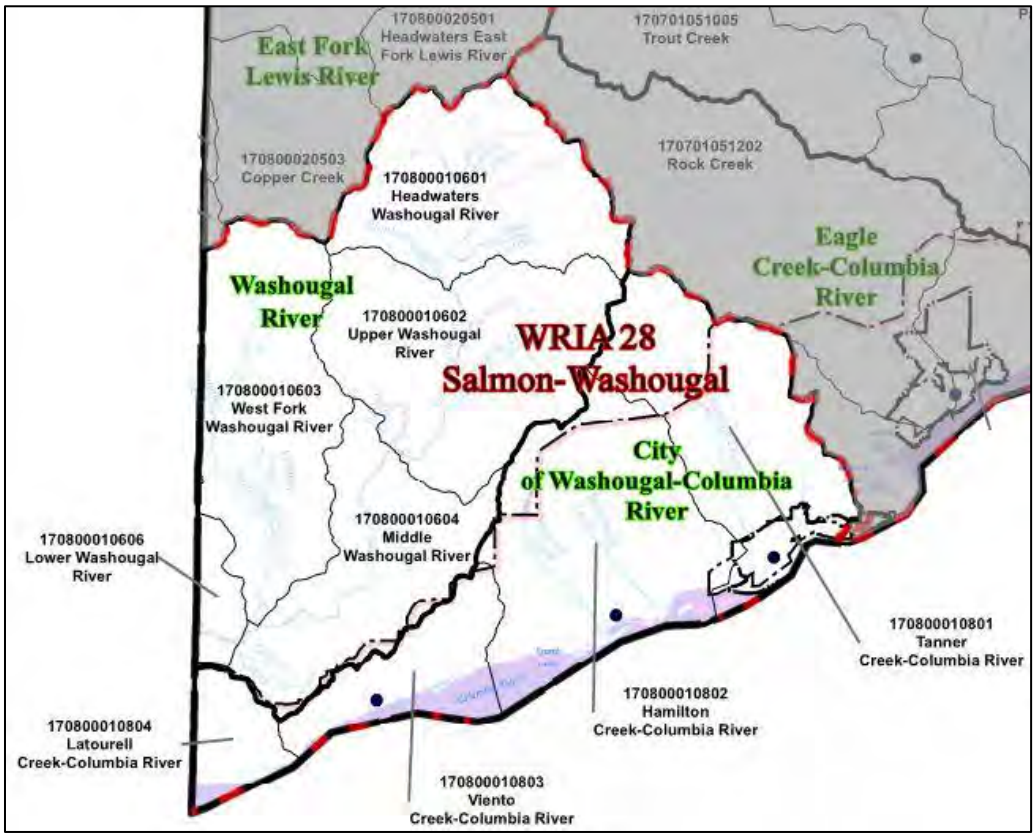
4.2.33.6 Public Access

The subwatershed has 7.86 miles of trails southwest of Mount Saint Helens National Volcanic Monument. There are no boat ramps, golf courses, or parks. The subwatershed is mostly inaccessible by roads. Further south of the subwatershed is Forest Road 8100.

4.2.33.7 Restoration Opportunities

The Headwaters Kalama River HUC is located within the Kalama River subbasin. Ecological conditions within this subwatershed are generally in good condition, but key restoration opportunities for this subwatershed and subbasin may include: managing forests to restore watershed processes, managing growth and development to protect habitat conditions and watershed processes, restoring passage at culverts or other barriers, aligning hatchery priorities to be consistent with conservation objectives, and managing fishery impacts to reduce risks to near-term populations and support progress toward recovery (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2010).

4.3 WRIA No. 28



WRIA 28 – Salmon-Washougal is approximately 495 square miles, of which approximately 160 square miles are located within the southwest portion of the County. The major surface waters of WRIA 28 that are located within the County include the Washougal River, West Fork Washougal River, Hamilton Creek, Tanner Creek, and portions of the Columbia River. The headwaters of the Washougal River are located within the Gifford Pinchot National Forest, and the river and its tributaries generally flow south and then west through Clark County toward the Columbia River. Duncan Creek, Hamilton Creek, Tanner Creek, and Woodward Creek flow south directly into the Columbia River and are within the Columbia River Gorge National Scenic Area. Some of the significant lakes located in WRIA 28 include Franz Lake and Woody's Lake.

WRIA 28 includes approximately 7,818.96 acres of shoreline jurisdictional area and 76.75 miles of streams under shoreline jurisdiction. Approximately 63 percent of the WRIA is publicly owned and 37 percent is privately owned. The existing land use within the WRIA includes approximately 58 percent government services (e.g., education, public administration, health care, government-owned national forest land), 23 percent mining and extraction establishments, 11 percent residence or accommodation functions, 5 percent undefined land uses, 3 percent agriculture, forestry, fishing, and hunting, and less than one percent of each of the following: general sales or services, manufacturing and wholesale trade, transportation,

communication, information, and utilities, arts, entertainment, and recreation, and construction related businesses. It has approximately 16,197.67 acres of landslide hazard zones and 5,662.25 acres of FEMA 100-year floodplain. Salmon and steelhead salmon populations within the WRIA have declined from historical levels and there are significant extinction risks for fall-run Chinook, chum, summer-run and winter-run steelhead, and coho because of a loss of tributary habitat quantity and quality, predation, and harvest and hatchery impacts (Lower Columbia Fish Recovery Board 2010).

4.3.1 Headwaters Washougal River (170800010601) – Map Sheets 5, 5b, and 5c

4.3.1.1 Overview

The Headwaters Washougal River (170800010601) hydrologic unit is approximately 14,048 total acres in size with 593.56 acres of shoreline jurisdictional area and 7.87 miles of shoreline streams. Using WGS 84, the subwatershed's downstream location is 45.7271/-122.1304, and its upstream location is 45.7717/-122.1353. The Headwaters Washougal River is located approximately 12 miles northwest of the city of Stevenson, Washington and in the northeast corner of WRIA 28. The Gifford Pinchot National Forest is adjacent to the northern reach of the Headwaters Washougal River.

4.3.1.2 Reaches

Washougal River Reach #1: This reach consists of the northernmost section of the Washougal River to the confluence with Lookout Creek and is approximately 0.7 miles long. Its downstream location is 45.7658/-122.1263, and its upstream location is 45.7718/-122.1353. This reach is not a shoreline of statewide significance.

Washougal River Reach #2: This reach of the Washougal River is from Lookout Creek to Prospector Creek and is approximately 2.2 miles long. Its downstream location is 45.7405/-122.1294, and its upstream location is 45.7658/-122.1263. This reach is not a shoreline of shoreline of statewide significance.

Washougal River Reach #3: This reach of the Washougal River is from Prospector Creek to Bluebird Creek and is approximately 0.7 miles long. Its downstream location is 45.7328/-122.1367, and its upstream location is 45.7405/-122.1294. This reach is not a shoreline of statewide significance.

Washougal River Reach #4: This reach of the Washougal River is from Bluebird Creek to the southernmost boundary of the Headwaters Washougal River (170800010601) hydrologic unit boundary. Its downstream location is 45.7271/-122.1304, and its upstream location is 45.7328/-122.1367. This reach is not shoreline of statewide significance.

Lookout Creek: From the northeast boundary of the Headwaters Washougal River (170800010601), flowing southwest for approximately 0.7 miles and feeding into

Reach #2 of the Washougal River. Its downstream location is 45.7658/-122.1263, and its upstream location is 45.7743/-122.1211. This reach is not a shoreline of statewide significance.

Deer Creek: The Deer Creek reach parallels the southern boundary of the Headwaters Washougal River (170800010601) hydrologic unit, flowing southwest for approximately 1.3 miles and feeding into the Prospect Creek. Its downstream location is 45.7427/-122.1159, and its upstream location is 45.7472/-122.0906. This reach is not a shoreline of statewide significance.

Prospector Creek: A tributary into the Washougal River (Reach #4), flowing southwest for approximately 1 mile. Its downstream location is 45.7405/-122.1294, and its upstream location is 45.7427/-122.1159. This reach is not a shoreline of statewide significance.

Bluebird Creek: From the northwestern extent of the Headwaters Washougal River (170800010601) hydrologic unit boundary, flowing southeast for approximately 0.8 miles and feeding into Reach #4 of the Washougal River. Its downstream location is 45.7328/-122.1367, and its upstream location is 45.7390/-122.1474. This reach is not a shoreline of statewide significance.

4.3.1.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-54.

Table 4-54. Surficial Geology and Soil Types - Headwaters Washougal River (170800010601)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits Of Rocks	83.31%
Diorite	9.02%
Andesite Flows	3.3%
Tuffs and Tuff Breccias	2.53%
Intrusive Andesite	1.63%
Basalt Flows, Grande Ronde Basalt Flows	Less than 1% each
Soil Types	
Aschoff-Rock Outcrop Complex (30 to 65% slopes)	27.1%
Kinney Loam (30 to 65% slopes)	20.1%
Dougan Very Gravelly Loam (30 to 65% slopes)	12.7%
Zygore-Rock Outcrop Complex (30 to 65% slopes)	11.7%
Andic Cryumbrepts (5 to 65% slopes)	4.7%
Zygore Gravelly Loam (30 to 65% slopes)	3.5%
Lithic Orthents, Andepts, Cryands, and Udands	2.4%
Skoly-Rock Outcrop Complex (30 to 65% slopes)	2.7%
Aschoff Very Gravelly Loam (30 to 65% slopes)	2.1%
Typic Dystrandepts (5 to 65% slopes)	1.7%
Washougal Loam (0 to 3% slopes)	1.7%

Type	Percent
Zygore Gravelly Loam (5 to 30%)	1.4%
Skoly Stony Loam (15 to 30% slopes)	1.4%
Kinney Loam (30 to 65% east slopes)	1.3%
Andic Haplumbrepts, MED/LO-SK, M, FRG	1.2%
Rock Outcrop-Xerorthents Complex (50 to 90% slopes); Rock Outcrop-Rubbleland Complex; Aschoff Very Gravelly Loam (5 to 30% slopes); Skoly Stony Loam (30 to 65% slopes); Kinney Loam (5 to 30% slopes); Mountzion Clay Loam (15 to 30% slopes); Skoly Stony Loam (2 to 15% slopes); Bandid Cindery Sandy Loam (65 to 90% slopes); Mountzion Clay Loam (2 to 15% slopes); and Mountzion Clay Loam (30 to 65% slopes)	1% or less each

The subwatershed has 23.5 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of 0.05 percent developed/other human use, 89 percent forested woodland, 1.3 percent recently disturbed or modified land, and 9.65 percent shrubland and/or grassland.

4.3.1.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetlands, herbaceous balds, talus slopes, as well as habitat for elk and black-tailed deer.

Approximately 12.23 stream miles of Washougal summer steelhead are found within the subwatershed, including non-shoreline jurisdiction streams. A total of 277 acres of freshwater forested/shrub wetlands were identified within the subwatershed.

4.3.1.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 98.5 percent government services and 1.5 percent mining and extraction establishments. Approximately 1.5 percent of the subwatershed is privately owned and 98.5 percent is publicly owned. In terms of zoning, the watershed is 47.1 percent forest and 52.9 percent unzoned.

The subwatershed has approximately 27.04 miles of roads with a road density of 1.23 miles per square mile, and approximately 4,513,524 square feet of impervious road surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include 27 archaeology sites register polygons. The subwatershed has one wellhead protection area associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

Washougal River #1

The reach has 0.67 total stream miles in 85.8 acres of jurisdictional area. The only existing land use within the reach is government services, and all of the reach is

publicly owned. In terms of zoning, the reach is 75.8 percent forest and 24.2 percent is unzoned. No additional altered conditions are known to be present within this reach.

Washougal River #2
The reach has 2.2 total stream miles in 173.04 acres of jurisdictional area. The only existing land use within the reach is government services. Approximately 100 percent of the reach is publicly owned. In terms of zoning, the reach is 81.5 percent forest and 18.5 percent is unzoned. There are approximately 0.82 miles of roads within the reach, resulting in 129,681 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Washougal River #3
The reach has 0.67 total stream miles in 30.79 acres of jurisdictional area. The existing land uses within the reach are 59.3 percent government services and 40.7 percent mining and extraction establishments. Approximately 59.3 percent of the reach is publicly owned and 40.7 percent is privately owned. In terms of zoning, the reach is 100 percent forest. There are no designated roads or impervious surfaces within the reach. No additional altered conditions are known to be present within this reach.

Washougal River #4
The reach has 0.52 total stream miles in 23.69 acres of jurisdictional area. The existing land uses within the reach is 7.6 percent government services and 92.4 percent mining and extraction establishments. Approximately 7.6 percent of the reach is publicly owned and 92.4 percent is privately owned. In terms of zoning, the reach is 100 percent forest. There are approximately 0.09 miles of roads within the reach, with approximately 14,660 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Lookout Creek
The reach has 0.68 total stream miles in 84.58 acres of jurisdictional area. The only existing land use within the reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 59.1 percent forest and 40.9 percent unzoned. No additional altered conditions are known to be present within this reach.

Deer Creek
The reach has 1.33 total stream miles in 108.63 acres of jurisdictional area. The only existing land use within the reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 76.2 percent forest and 23.8 percent unzoned. There are approximately 0.97 miles of roads within the reach, with approximately 153,097 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Prospector Creek

The reach has 0.98 total stream miles in 46.31 acres of jurisdictional area. The only existing land use within the reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 100 percent forest. There are approximately 0.73 miles of roads within the reach, with approximately 114,417 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Bluebird Creek

The reach has 0.82 total stream miles in 40.69 acres of jurisdictional area. The only existing land use within the reach is government services and all of the reach is publicly owned. In terms of zoning, the reach is 91.9 percent forest and 8.1 percent unzoned. There are approximately 0.07 miles of roads within the reach, with approximately 10,983 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

4.3.1.6 Public Access

The subwatershed has 1.35 miles of trails. The mainstem Washougal River is generally accessible from Washougal River Road. The northern portion of the subwatershed may be accessible from USFS NF-41 and W-2000.

4.3.1.7 Restoration Opportunities

The upper reaches are important summer and winter rearing areas for summer steelhead. The habitat conditions and watershed processes associated with these reaches are influenced primarily by actions on public and private timberland. While the ecological conditions within this subwatershed are generally in good condition and these lands have relatively intact landscape conditions, sediment supply processes are thought to be moderately impaired because of the prevalence of forest roads on unstable slopes. The potential for effective passive restoration is high through upgrading or removing roads and improving drainage systems (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2006).

4.3.2 Upper Washougal River (170800010602) – Map Sheets 5b, 5c, 5e, and 5f

4.3.2.1 Overview

The Upper Washougal River hydrologic unit (170800010602) is approximately 17,511 total acres with 547.44 acres of shoreline jurisdictional area and 9.81 miles of shoreline jurisdiction streams. Using the WGS 84, the subwatershed's downstream location is 45.6726/-122.1552 and its upstream location is 45.72712/-122.1304. The Upper Washougal River is in the northeastern corner of WRIA 28 and on the southern boundary of Gifford Pinchot National Forest. The Upper Washougal River HUC includes the Washougal River with Stebbins Creek and Dougan Creek tributaries.

4.3.2.2 Reaches

Washougal River Reach #5: This reach of the Washougal River starts at the upper boundary of the HUC and extends downstream to the confluence with Stebbins Creek. Its downstream location is 45.6912/-122.1226, and its upstream location is 45.7271/-122.1304. This reach is not a shoreline of statewide significance.

Washougal River Reach #6: This reach extends from the confluence of tributary Stebbins Creek to the confluence of Dougan Creek. Its downstream location is 45.6726/-122.1552, and its upstream location is 45.6911/-122.1226. This reach is not a shoreline of statewide significance.

Stebbins Creek: Stebbins Creek is located in the northeast corner of the watershed, flowing southwest to the confluence with the Washougal River (Reach #5). Its downstream location is 45.6911/-122.1226, and its upstream location is 45.7158/-122.0857. This reach is not a shoreline of statewide significance.

Dougan Creek: Dougan Creek is located in the southwest corner of the watershed, flowing southeast to the confluence with the Washougal River (Reach #6). Its downstream location is 45.6726/-122.1552, and its upstream location is 45.6886/-122.1563. This reach is not a shoreline of statewide significance.

4.3.2.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-55.

Table 4-55. Surficial Geology and Soil Types - Upper Washougal River (170800010602)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	65.44%
Andesite Flows	17.17%
Tuffs and Tuff Breccias	15.19%
Alluvium, Basalt Flows, Continental Sedimentary Deposits or Rocks, Conglomerate, Diorite, Intrusive Andesite, and Mass-Wasting Deposits – Mostly Landslides	Less than 1% each
Soil Types	
Aschoff-Rock Outcrop Complex (30 to 65% slopes)	27.1%
Kinney Loam (30 to 65% slopes)	20.1%
Dougan Very Gravelly Loam (30 to 65% slopes)	12.7%
Zygore-Rock Outcrop Complex (30 to 65% slopes)	11.7%
Andic Cryumbrepts (5 to 65% slopes)	4.7%
Zygore Gravelly Loam (30 to 65% slopes)	3.5%
Skoly-Rock Outcrop Complex (30 to 65% slopes)	2.7%
Lithic Orthents, Andepts, Cryands, Udands	2.4%
Aschoff Very Gravelly Loam (30 to 65% slopes)	2.1%
Typic Dystrandepts (5 to 65% slopes)	1.7%
Washougal Loam (0 to 3% slopes)	1.7%

Type	Percent
Skoly Stony Loam (15 to 30% slopes)	1.4%
Zygore Gravelly Loam (5 to 30% slopes)	1.4%
Andic Haplumbrepts (med/lo-sk, m, frg)	1.2%
Rock Outcrop-Xerorthents Complex (50 to 90% slopes)	1.0%
Andic Cryumbrepts, Med/Lo-Sk, M; Aschoff Very Gravelly Loam (5 to 30% slopes); Bandid Cindery Sandy Loam (65 to 90% slopes); Bonneville Stony Sandy Loam; Kinney Loam (5 to 30% slopes); Mountzion Clay Loam (15 to 30% slopes); Mountzion Clay Loam (2 to 15% slopes); Mountzion Clay Loam (30 to 65% slopes); Pits; Rock Outcrop-Rubbleland Complex; Skoly Stony Loam (2 to 15% slopes); and Skoly Stony Loam (30 to 65% slopes)	Less than 1% of each

The subwatershed has approximately 82.65 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of 78.51 percent forested woodland, 14.81 percent recently disturbed or modified land, 6.62 percent shrubland and/or grassland, 0.02 percent agriculture, and 0.05 percent developed other human use.

4.3.2.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetlands, riverine wetlands, talus slopes, cliffs/bluffs, and herbaceous bald as well as mule and black-tailed deer and elk habitats. The PHS species within the subwatershed include Larch Mountain salamander and Cascade Torrent salamander.

The subwatershed includes approximately 15.76 stream miles of habitat for Washougal summer steelhead, 7.14 stream miles of mainstream Washougal coastal cutthroat habitat, and 0.08 stream miles of habitat for each of the following: Washougal coho, Washougal fall Chinook, and Washougal winter steelhead.

A total of 17,511 acres of NWI wetlands were identified within the subwatershed. These wetlands include 83.33 percent freshwater forested/shrub wetland, and 13.67 percent riverine wetlands.

4.3.2.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 66.9 percent services – government; 31.0 percent mining and extraction establishments; 1.9 percent residence or accommodation functions; 0.3 percent agriculture, forestry, fishing and hunting; and 0.001 percent transportation, communication, information, and utilities. Approximately 33.1 percent of the subwatershed is privately owned and 66.9 percent is publicly owned. In terms of zoning, the watershed is 94.3 percent forest and 5.7 percent unzoned.

The subwatershed has approximately 84.47 miles of roads with a road density of 3.09 miles per square mile. The subwatershed has approximately 10,730 square feet of impervious surface for structures, and 13,857,591 square feet of impervious road surfaces for a total of 13,868,321 square feet of impervious areas.

Known archaeological, cultural, or historical resources within the subwatershed include three historic register polygons. The subwatershed has one wellhead protection area associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

Washougal River Reach #5

The reach has a total of 2.96 jurisdictional stream miles with 214.30 acres of jurisdictional area. The existing land uses within Reach #5 of the Washougal River are 67.1 percent government services; 15.7 percent mining and extraction establishments; 10.5 percent residence or accommodation functions; and 6.8 percent agriculture, forestry, fishing and hunting. Approximately 33 percent of the reach is privately owned and 67 percent is publicly owned. In terms of zoning, the reach is 100 percent forest. There are approximately 1.68 miles of roads within the reach for a total of 322,639 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Washougal River Reach #6

The reach has a total of 2.57 jurisdictional stream miles with 123.55 acres of jurisdictional area. The existing land uses within Reach #6 of the Washougal River are 37.79 percent government services; 54.71 percent mining and extraction establishments; 2.82 percent residence or accommodation functions; 4.51 percent agriculture, forestry, fishing and hunting; and less than 1 percent undefined. Approximately 62 percent of the reach is privately owned and 38 percent is publicly owned. In terms of zoning, the entire reach is zoned forest. There are approximately 1.58 miles of roads within the reach for a total of 333,954 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Stebbins Creek

The reach has 2.86 jurisdictional stream miles with 138.84 acres of jurisdictional area. The existing land uses within Stebbins Creek are 97.19 percent government services, 0.41 percent mining and extraction establishments, and 2.41 percent agriculture, forestry, fishing and hunting. Approximately 2.81 percent of the reach is privately owned and 97.19 percent is publicly owned. In terms of zoning, the entire reach is zoned forest. There are approximately 0.06 miles of roads within the reach for a total of 12,245 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Dougan Creek

The reach has 1.42 jurisdictional stream miles and 70.75 acres of jurisdictional area. The only existing land use within Dougan Creek is government services. All of the reach is publicly owned. In terms of zoning, all of the reach is zoned forest. There are approximately 1.35 miles of roads within the reach for a total of 212,142 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

4.3.2.6 Public Access

The subwatershed is accessible from Washougal River Road and USFS W-2000. There are no trails, parks, or boat launches within the subwatershed.

4.3.2.7 Restoration Opportunities

The upper reaches are important summer and winter rearing areas for summer steelhead. The habitat conditions and watershed processes associated with these reaches are influenced primarily by actions on public and private timberland. While the ecological conditions within this subwatershed are generally in good condition and these lands have relatively intact landscape conditions, sediment supply processes are thought to be moderately impaired because of the prevalence of forest roads on unstable slopes. The potential for effective passive restoration is high through upgrading or removing roads and improving drainage systems (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2006).

4.3.3 West Fork Washougal River (170800010603) – Map Sheets 5b and 5e

4.3.3.1 Overview

The West Fork Washougal River hydrological unit (170800010603) is approximately 15,652 total acres with 620.37 acres of shoreline jurisdictional area and 12.66 miles of shoreline jurisdiction streams. Using WGS 84, the subwatershed's downstream location is 45.6123/-122.2189. The West Fork Washougal River watershed's upper reach starts on the south flanks of Silver Star Mountain within the southern edge of the Gifford Pinchot National Forest and ends at the confluence with the Washougal River.

4.3.3.2 Reaches

West Fork Washougal River Reach #1: The northern extent starts within the southern boundary of the Gifford Pinchot National Forest and ends at the confluence with the Unnamed Tributary to the West Fork Washougal River. Its downstream location is 45.7033/-122.2280, and its upstream location is 45.7235/-122.2226. This reach is not a shoreline of statewide significance.

Washougal River Unnamed Tributary to West Fork (Washougal River WF UT: This reach runs parallel with the West Fork Washougal River Reach #1 to the east and ends at its confluence with the West Fork Washougal River Reach #1. Its

downstream location is 45.7033/-122.2280, and its upstream location is 45.7072/-122.2172. This reach is not a shoreline of statewide significance.

West Fork Washougal River Reach #2: This reach starts at the confluence with the West Fork Washougal River Reach #1 and Reach UT and ends at the confluence with Hagen Creek. Its downstream location is 45.6835/-122.2431, and its upstream location is 45.7032/-122.2280. This reach is not a shoreline of statewide significance.

Hagen Creek: This reach starts northwest of the West Fork Washougal River Reach #2 and ends at the confluence with the West Fork Washougal River Reach #2. Its downstream location is 45.6835/-122.2431, and its upstream location is 45.6931/-122.2492. This reach is not a shoreline of statewide significance.

West Fork Washougal River Reach #3: This reach starts at the confluence with Hagen Creek and ends at the confluence with Wildboy Creek. Its downstream location is 45.6487/-122.2149, and its upstream location is 45.6835/-122.2431. This reach is not a shoreline of statewide significance.

Wildboy Creek: This reach starts east of West Fork Washougal River Reach #3 and ends at the confluence with West Fork Washougal River Reach #4. Its downstream location is 45.6487/-122.2149, and its upstream location is 45.6710/-122.2185. This reach is not a shoreline of statewide significance.

West Fork Washougal River Reach #4: This reach starts at the confluence with Wildboy Creek and ends at the confluence with the Washougal River. Its downstream location is 45.6122/-122.2189, and its upstream location is 45.6487/-122.2149. This reach is not a shoreline of statewide significance.

4.3.3.3 Physical Environment

Information about the surficial geology (i.e., lithology) and types of soils in the subwatershed is listed in Table 4-56.

Table 4-56. Surficial Geology and Soil Types - West Fork Washougal River (170800010603)

Type	Percent
Surficial Geology	
Andesite Flows	44.73%
Granodiorite	22.47%
Volcaniclastic Deposits or Rocks	14.80%
Quartz Diorite	12.08%
Basalt Flows	5.13%
Diorite, Intrusive Andesite, and Terraced Deposits	Less than 1% each
Soil Types	
Kinney Loam (30 to 60% slopes)	15.28%
Kinney Loam (5 to 30% slopes)	12.71%
Dougan Very Gravelly Loam (30 to 65% slopes)	11.96%
Antic Haplumbrepts, med/lo-sk, m, frg	8.57%

Type	Percent
Skoly Stony Loam (30 to 65% slopes)	7.28%
Lithic Outhunts, Andepts, Cryands, Udands	6.66%
Kinney Loam (30 to 65% east slopes)	5.15%
Mountzion Clay Loam (2 to 15% slopes)	4.70%
Antic Cryumbrepts, med/lo-sk, m	4.60%
Skoly Stony Loam (15 to 30% slopes)	4.14%
Mountzion Clay Loam (30 to 65% slopes)	3.07%
Mossyrock Silt Loam (2 to 5% slopes)	2.82%
Dougan Very Gravelly Loam (5 to 30% slopes)	1.96%
Mountzion Clay Loam (15 to 30% slopes)	1.74%
Skoly Stony Loam (2 to 15% slopes)	1.61%
Rock Outcrop-Rubbleland Complex	1.31%
Xerorthents-Rock outcrop complex (50 to 90% slopes)	1.17%
Mossyrock Silt Loam (5 to 15% slopes)	1.00%
Typic Dystrandepts (5 to 65% slopes); Andic Cryumbrepts (5 to 65% slopes); Skelida Silt Loam (5 to 15% slopes); Skoly-Rock Outcrop Complex (5 to 30% slopes); Bonneville Stony Sandy Loam; Hesson Clay Loam (5 to 15% slopes); Washougal Loam (0 to 3% Slopes); Water; Arents (0 to 5% slopes); Skelida Silt Loam (15 to 30% Slopes); Rock Outcrop-Xerorthents Complex (50 to 90% slopes); and Haplumbrepts (0 to 3% slopes).	Less than 1% each

The subwatershed has no areas of landslide hazard zones. The subwatershed has a total of 38.31 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of 66.81 percent forested woodland, 18.28 percent recently disturbed or modified land, 12.60 percent shrubland and/or grassland, 1.43 percent agriculture, 0.77 percent nonvascular or sparse vascular rock vegetation, and 0.08 percent developed/other human use.

4.3.3.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetlands, freshwater ponds, riverine wetlands, cliffs/bluffs, herbaceous bald, as well as habitat for mule deer and black-tailed deer, and elk. The PHS species within the subwatershed include northern spotted owl, bald eagle, northern goshawk, Larch Mountain salamander, and the Cascade Torrent salamander. The non-PHS species monitored within the subwatershed include tailed frog.

Approximately 25.51 stream miles of mainstem Washougal coastal cutthroat, 15.66 stream miles of Washougal summer steelhead, 11.59 stream miles of Washougal coho, 6.28 stream miles of Washougal winter steelhead, and 0.71 stream miles of Washougal fall Chinook habitat are found within the subwatershed.

A total of 54.76 acres of NWI wetlands were identified within the subwatershed. These wetlands include 80.13 percent of freshwater forested/shrub wetland, 19.84 percent of freshwater pond, and 0.03 percent of riverine wetlands.

4.3.3.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 42.63 percent mining and extraction establishments; 39.84 percent government services; 14.11 percent residence or accommodation functions; 2.51 percent agriculture, forestry, fishing and hunting; and 0.92 percent undefined. Approximately 59.25 percent of the subwatershed is privately owned and 40.75 percent is publicly owned. In terms of zoning, the watershed is 68.34 percent forest, 19.87 percent unzoned, 11.24 percent residential - lower density, and 0.54 percent residential – higher density.

The subwatershed has approximately 101.30 miles of roads and a road density of 4.14 miles per square mile. The subwatershed has approximately 738,886 square feet of impervious structural surfaces and 16,469,085 square feet of impervious road surfaces for a total of 17,207,971 square feet of impervious area. The subwatershed has no state highway bridges, and data for bridges on County or other roads was not available.

Known archaeological, cultural, or historical resources within the subwatershed include 13 archaeological sites. The subwatershed has 13 wellhead protection areas associated with Group A and Group B wells. There are no 303(d) listings and no state cleanup site listings within the watershed.

The dams within the subwatershed include Caldwell Dam (45.6515/-122.2474), which is located approximately 2 miles west of the confluence of Wildboy Creek and Reach #4 of the West Fork Washougal River, and Camp Kwoneesum Dam (45.6713/-122.2189), which is located on the upstream extent of Wildboy Creek.

West Fork Washougal River (Reach #1)

This reach has a total of 1.57 jurisdictional stream miles and 77.23 acres of shoreline jurisdictional area. The existing land uses within this reach are 53.82 percent government services, 31.45 percent agriculture, forestry, fishing and hunting, 9.85 percent mining and extraction establishments, and 4.88 percent residence or accommodation functions. Approximately 46.18 percent of the reach is privately owned and 53.82 percent is publicly owned. In terms of zoning, the reach is 92.9 percent forest and 7.1 percent unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Washougal River Unnamed Tributary to West Fork

This reach has a total of 0.65 jurisdictional stream miles and 32.27 acres of shoreline jurisdictional area. The existing land uses within this reach are 99.65 percent mining

and extraction establishments, and 0.35 percent government services. Approximately 99.65 percent of the reach is privately owned and 0.35 percent is publicly owned. In terms of zoning, all of the reach is forest. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

West Fork Washougal River (Reach #2)

This reach has a total of 1.69 jurisdictional stream miles and 79.57 acres of shoreline jurisdictional area. The existing land uses within this reach are 51.24 percent government services and 48.76 percent mining and extraction establishments. Approximately 48.76 percent of the reach is privately owned and 51.24 percent is publicly owned. In terms of zoning, all of the reach is forest. There are approximately 0.10 miles of roads within the reach. It has a total of 20,421 square feet of impervious road surfaces and no impervious area for structures. No additional altered conditions are known to be present within this reach.

Hagen Creek

This reach has a total of 0.78 jurisdictional stream miles and 35.91 acres of shoreline jurisdictional area. The existing land uses within this reach are 99.64 percent mining and extraction establishments, and 0.36 percent government services. Approximately 99.64 percent of the reach is privately owned and 0.36 percent is publicly owned. In terms of zoning, all of the reach is forest. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

West Fork Washougal River (Reach #3)

This reach has a total of 3.27 jurisdictional stream miles and 157.83 acres of shoreline jurisdictional area. The existing land uses within this reach are 64.61 percent residence or accommodation functions, 35.20 percent mining and extraction establishments, and 0.19 percent undefined. Approximately 99.81 percent of the reach is privately owned and 0.19 percent is publicly owned. In terms of zoning, the reach is 65.54 percent forest, and 34.46 percent residential – lower density. There are approximately 0.63 miles of roads within the reach jurisdiction – approximately 20,950 square feet of impervious surface of structures and 109,124 square feet of impervious road surfaces for a total of 130,074 square feet of impervious areas. No additional altered conditions are known to be present within this reach.

Wildboy Creek

This reach has a total of 1.80 jurisdictional stream miles and 96.65 acres of shoreline jurisdictional area. The existing land uses within this reach are 99.69 percent mining and extraction establishments, and 0.31 percent residence or accommodation functions. All of the reach is privately owned. In terms of zoning, the reach is 94.52 percent forest, and 5.48 percent residential – lower density. There are approximately 0.17 miles of roads within the reach. It has a total of 26,234 square feet of impervious

road surfaces and no impervious area for structures. No additional altered conditions are known to be present within this reach.

West Fork Washougal River (Reach #4)
This reach has a total of 2.89 jurisdictional stream miles and 140.91 acres of shoreline jurisdictional area. The existing land uses within this reach are 62.92 percent residence or accommodations functions, 18.59 percent mining and extraction establishments, 11.61 percent government services, 4.26 percent undefined, and 2.61 percent agriculture, forestry, fishing and hunting. Approximately 84.21 percent of the reach is privately owned and 15.79 percent is publicly owned. In terms of zoning, the reach is 34.59 percent residential - lower density, 54.0 percent forest, and 11.46 percent residential - higher density.

There are approximately 0.54 miles of roads within the reach jurisdiction. It has approximately 95,265 square feet of impervious surface for structures and 89,540 square feet of impervious road surfaces, which equals for a total of 184,805 square feet of impervious areas. There wellhead protection areas located within this reach. No additional altered conditions are known to be present within this reach.

4.3.3.6 Public Access
The subwatershed has 4.75 miles of trails. The upper portion of the subwatershed is difficult to access. Approximately 2 miles of the lower section of Reach #3 of the West Fork Washougal River from the mainstem Washougal River is accessible from North Fork Road.

4.3.3.7 Restoration Opportunities
The West Fork Washougal River is important for summer steelhead spawning and rearing. Portions of the headwaters (i.e., Hagen Creek basin) have intact forest conditions, while most other areas have been extensively harvested and have many roads. An additional habitat concern in the West Fork basin is a dam on Wildboy Creek, which blocks several miles of potentially productive habitat. Effective habitat measures will involve riparian restoration, reestablishing connections between the stream channel and floodplains, growth management, water withdrawal management, and watershed process restoration and preservation on forest lands (Lower Columbia Fish Recovery Board 2006).

4.3.4 Middle Washougal River (170800010604) – Map Sheet 5e

4.3.4.1 Overview
The Middle Washougal River (170800010604) HUC is approximately 12,549 total acres, and includes 514 acres of shoreline jurisdictional area and 10.59 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 45.6055/-122.2290, and its upstream location is 45.6726/-122.1552. The Middle Washougal River's upstream extent is at the confluence with Dougan Creek in the north and ends at the confluence with Canyon

Creek in the south near the intersection of Washougal River Road and Canyon Creek Road.

Washougal River (Skamania County 2015a)

4.3.4.2 Reaches

Washougal River Reach #7: From the confluence of Dougan Creek to the confluence with the West Fork Washougal River approximately 7 miles downstream. Its downstream location is 45.6123/-122.2189, and its upstream location is 45.6726/-122.1552. This reach is not a shoreline of statewide significance.

Washougal River Reach #8: From the confluence with the West Fork Washougal River to the confluence with Canyon Creek approximately 1 mile downstream. Its downstream location is 45.6055/-122.2290, and its upstream location is 45.6123/-122.2189. This reach is not a shoreline of statewide significance.

Canyon Creek: From the west side of Archer Mountain to the confluence with Washougal River approximately 2.55 miles downstream. Its downstream location is 45.6055/-122.2290, and its upstream location is 45.5963/-122.1917. This reach is not a shoreline of statewide significance.

4.3.4.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed is listed in Table 4-57.

Table 4-57. Surficial Geology and Soil Types - Middle Washougal River (170800010604)

Type	Percent
Surficial Geology	
Andesite Flows	70.59%
Volcaniclastic Deposits of Rocks	8.98%
Tuffs and Tuff Breccias	4.66%
Basalt Flows (Grand Ronde Basalt, upper flows of norm. mag. pol.)	4.56%
Mass-Wasting Deposits, Mostly Landslides	4.34%
Terraced Deposits	1.58%
Alluvium	1.55%
Basalt Flows (Frenchman Springs Member [CRB,WB])	1.43%
Basalt Flows (Grande Ronde Basalt, upper flows of rev. mag. pol.)	1.21%
Continental Sedimentary Deposits or Rocks	1.1%
Soil Types	
Skoly Stony Loam (30 to 65% slopes)	17.51%
Skoly-Rock Outcrop Complex (30 to 65% slopes)	16.20%
Skoly Stony Loam (15 to 30% slopes)	13.78%
Skoly Stony Loam (2 to 15% slopes)	9.82%
Mountzion Clay Loam (30 to 65% slopes)	7.37%
Mountzion Clay Loam (2 to 15% slopes)	5.34%
Hesson Clay Loam (30 to 40% slopes)	4.89%
Skelida Silt Loam (5 to 15% slopes)	4.03%
Mountzion Clay Loam (15 to 30% slopes)	2.92%
Kinney Loam (30 to 65% slopes)	2.64%
Typic Dystrandepts (5 to 65% slopes)	2.16%
Bonneville stony sandy loam	1.52%
1.47% Skoly-Rock outcrop complex (5 to 30% slopes)	1.47%
Kinney loam (30 to 65% east slopes);	1.41%
Haplumbrepts (0 to 3% slopes);	1.36%
Zygore Gravelly Loam (5 to 30% slopes)	1.20%
Zygore Gravelly Loam (30 to 65% slopes); Mcdoug Silt Loam, Hesson Clay Loam (5 to 15% slopes); Washougal Loam (0 to 3% slopes); Hesson Clay Loam (15 to 30% slopes); Skelida Silt Loam (15 to 30% slopes); Mossyrock Silt Loam (2 to 5% slopes); Riverwash, Rock Outcrop-Rubbleland Complex; Skamania Very Fine Sandy Loam (30 to 40% slopes); Rock Outcrop-Xerorthents Complex (50 to 90% slopes); Bandid Cindery Sandy Loam (65 to 90% slopes); Dougan Very Gravelly Loam (30 to 65% slopes); Mossyrock Silt Loam (5 to 15% slopes); Water; And Steever-Rock Outcrop Complex (30 to 65% slopes)	Less than 1% each

The subwatershed has approximately 545 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of 78.51 percent forested woodland, 14.81 percent recently disturbed or modified land, 6.62 percent shrubland and/or grassland, 0.05 percent developed other human use, and 0.02 percent agriculture. The subwatershed has a total of 306.26 acres of 100-year FEMA floodplain.

4.3.4.4 Biological Resources

The PHS priority habitat types within the subwatershed include riverine wetland, freshwater forested/shrub wetlands, freshwater emergent wetland, freshwater pond, caves or cave-rich areas, talus slopes, and habitat for mule and black-tailed deer. The PHS species within the subwatershed include northern spotted owl, Larch Mountain salamander, and Cascade Torrent salamander. The monitored non-PHS species within the subwatershed include tailed frog and Cope's giant salamander.

The following fish are found within the subwatershed: approximately 15.76 stream miles of Washougal summer steelhead, 7.14 stream miles of mainstem Washougal coastal cutthroat, and 0.08 percent of each of the following: Washougal coho, Washougal fall Chinook, and Washougal winter steelhead.

A total of 134.46 acres of NWI wetlands were identified within the subwatershed. They include 47.47 percent riverine wetland, 43 percent freshwater forested/shrub wetland, and 7.93 percent freshwater emergent wetland, and 1.60 percent of freshwater pond.

4.3.4.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 38.48 percent mining and extraction establishments; 25.67 percent residence or accommodation functions; 23.58 percent government services; 9.09 percent agriculture, forestry, fishing and hunting; 1.65 percent undefined; 1.34 percent construction-related business; and less than 1 percent of the following: general sales or services and transportation, communication, information and utilities.

Approximately 74.74 percent of the subwatershed is privately owned and 25.26 percent is publicly owned. In terms of zoning, the watershed is 60.94 percent forest, 30.07 percent residential – lower density, 7.86 percent residential – higher density, and less than 1 percent of the following: agriculture, commercial, open space/conservancy, and unzoned.

The subwatershed has approximately 95.85 miles of roads and a road density of 4.89 miles per square mile. The subwatershed has approximately 1,533,393 square feet of impervious structural surfaces and 16,212,074 square feet of impervious road surfaces, for a total of 17,745,467 square feet of impervious area.

Known archaeological, cultural, or historical resources within the subwatershed include three historic register properties, one archaeological sites, and one cemetery.

The subwatershed has 32 wellhead protection areas associated with Group A and Group B wells. In the subwatershed, there are no 303(d) listings but there are two state cleanup site listings.

The subwatershed includes one dam on an unnamed stream, which is known as Julian Dam. The dam is located on the east side of Salmon Falls Road (45.6098/-122.1929).

Washougal River Reach #7

This reach has 7.27 total stream miles under shoreline jurisdiction and 354.21 acres of shoreline jurisdictional area. The existing land uses within this reach are 32.04 percent residence or accommodation functions, 29.39 percent government services, 22.72 percent agriculture, forestry, fishing and hunting, 10.91 percent mining and extraction establishments, 2.97 percent construction-related business, and 1.98 percent undefined. Approximately 68.62 percent of the reach is privately owned and 31.38 percent is publicly owned. In terms of zoning, the reach is 65.60 percent forest, 17.31 percent residential – lower density, and 17.09 percent residential – higher density.

There are approximately 1.15 miles of roads within the reach jurisdictional area. It has approximately 161,427 square feet of impervious structural surfaces and 240,110 square feet of impervious road surfaces, for a total of 401,537 square feet of impervious areas. This reach has wellhead protection areas. There is a state cleanup site listing within this reach. No additional altered conditions are known to be present within this reach.

Washougal River Reach #8

This reach has 0.76 total stream miles under shoreline jurisdiction and 35.88 acres of shoreline jurisdictional area. The existing land uses within this reach are 89.65 percent residence or accommodation functions, and 10.35 percent agriculture, forestry, fishing and hunting. All of the reach is privately owned. In terms of zoning, the reach is 86.53 percent residential – higher density, and 13.47 percent residential – lower density.

There are approximately 0.10 miles of roads within the reach jurisdictional area. It has approximately 55,002 square feet of impervious structural surfaces and 14,437 square feet of impervious road surfaces, for a total of 69,439 square feet of impervious areas. This reach has wellhead protection areas. No additional altered conditions are known to be present within this reach.

Canyon Creek

This reach has 2.55 total stream miles under shoreline jurisdiction and 124.03 acres of shoreline jurisdictional area. The existing land uses within this reach are 53.47 percent residence or accommodation functions, 23.23 percent agriculture,

forestry, fishing and hunting, 10.58 percent mining and extraction establishments, 6.45 percent government services, and 6.26 percent undefined. Approximately 87.29 percent of the reach is privately owned and 12.71 percent is publicly owned. In terms of zoning, the reach is 98.35 percent residential – lower density, 1.65 percent residential – higher density.

There are approximately 1.45 miles of roads within the reach jurisdictional area. It has approximately 20,376 square feet of impervious structural surfaces and 294,865 square feet of impervious road surfaces, for a total of 315,241 square feet of impervious areas. This reach has wellhead protection areas. There is a state cleanup site listing within this reach. No additional altered conditions are known to be present within this reach.

4.3.4.6 Public Access

The subwatershed has 1.37 miles of trails and one park (Skamania County Prindle Park). The subwatershed along the mainstem Washougal River corridor is primarily accessible from Washougal River Road. The subwatershed along the lower section of Canyon Creek is fairly accessible using Canyon Creek Road. The upper section of Canyon Creek is accessible using Mabee Mines Road and Kellet Road.

4.3.4.7 Restoration Opportunities

The Middle Washougal River is important for fall Chinook and coho spawning, incubation, and fry colonization. It is also used by steelhead for rearing. As the human population continues to grow, this mixed-use area of rural residents and small farms and woodlands is likely to experience conversion to more intensive residential use. Riparian areas have been degraded through streamside development and roads. Sediments, lack of habitat diversity, and temperature are the most significant limiting factors in this area. Restoration opportunities include protecting remaining functional habitat, riparian restoration, re-establishing connections between the stream channel, and stormwater controls (Lower Columbia Fish Recovery Board 2006).

4.3.5 Lower Washougal River (170800010606) – Map Sheet 5e

4.3.5.1 Overview

The Lower Washougal River hydrologic unit (170800010606) is approximately 2,116 total acres, and includes 77.16 acres of shoreline jurisdictional area and 1.70 miles of streams under shoreline jurisdiction. Using WGS 84, the subwatershed's downstream location is 45.6072/-122.2319, and its upstream location is 45.6086/-122.2372. This HUC is located in the southwestern corner of Skamania County and extends into Clark County to the west.

4.3.5.2 Reaches

Washougal River Reach #9: From the confluence with Canyon Creek to the westernmost boundary of Skamania County approximately 0.3 miles downstream.

Its downstream location is 45.6072/-122.2319, and its upstream location is 45.6086/-122.2372. This reach is not a shoreline of statewide significance.

4.3.5.3 Physical environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed is listed in Table 4-58.

Table 4-58. Surficial Geology and Soil Types - Lower Washougal River (170800010606)

Type	Percent
Surficial Geology	
Mass-Wasting Deposits, Mostly Landslides	33.26%
Basalt Flows	31.49%
Terraced Deposits	13.85%
Andesite Flows	11.01%
Continental Sedimentary Deposits or Rocks	10.39%
Soil Types	
Mossyrock Silt Loam (2 to 5% slopes)	18.48%
Mountzion Clay Loam (2 to 15% slopes)	16.29%
Hesson Clay Loam (30 to 40% slopes)	13.54%
Skoly Stony Loam (15 to 30% slopes)	12.01%
Skoly Stony Loam (30 to 65% slopes)	9.00%
Haplumbrepts (0 to 3% slopes)	7.92%
Mossyrock Silt Loam (5 to 15% slopes)	6.15%
Hesson Clay Loam (5 to 15% slopes)	4.95%
Hesson Clay Loam (5 to 15% slopes)	3.57%
Skoly Stony Loam (2 to 15% slopes)	3.15%
Hesson Clay Loam (15 to 30% slopes)	1.48%
McDoug Silt Loam	1.14%
Bonneville Stony Sandy Loam; McDoug Silt Loam; Kinney Loam (30 to 65% slopes), and Kinney Loam (5 to 30% slopes)	Less than 1% each

The subwatershed has approximately 703.76 acres of landslide hazard zones and a total of 54.48 acres of 100-year FEMA floodplain.

Vegetated cover within the subwatershed is composed of 49.58 percent forested woodland, 34.41 percent recently disturbed or modified land, 14.25 percent agriculture, 1.25 percent developed/other human use, and 0.50 percent shrubland and/or grassland.

4.3.5.4 Biological Resources

The PHS priority habitat types within this subwatershed include freshwater forested/shrub wetland, rivering wetland, and freshwater emergent wetland. The PHS species within the subwatershed include northern spotted owl and Cascade Torrent salamander. The only monitored non-PHS species within the subwatershed is the reticulate sculpin.

Approximately 1.77 stream miles of Washougal winter steelhead, 1.59 stream miles of Washougal coho and summer steelhead, and 1.43 stream miles of Mainstem Washougal coastal cutthroat and fall Chinook habitats are found within the subwatershed.

A total of 51.26 acres of NWI wetlands were identified within the subwatershed. These wetlands include 45.61 percent freshwater forested/shrub wetland, 39.63 percent riverine wetland, and 14.76 percent freshwater emergent wetland.

4.3.5.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 60.84 percent residence or accommodation functions, 17.40 percent agriculture, forestry, fishing and hunting, 14.01 percent mining and extraction establishments, 3.95 percent undefined, 3.65 percent government services, and less than 1 percent for the following: arts, entertainment, and recreation; transportation, communication, information and utilities; and construction related business. Approximately 92.90 percent of the subwatershed is privately owned and 7.10 percent is publicly owned. In terms of zoning, the watershed is 58.84 percent residential – lower density, 30.25 percent residential – higher density, 9.41 percent forest, 1.13 percent commercial, and 0.30 percent agriculture.

The subwatershed has approximately 15.27 miles of roads and a road density of 4.62 miles per square mile. The subwatershed has approximately 1,015,965 square feet of impervious surface of structures and 2,527,208 square feet of impervious road surfaces, for a total of 3,543,173 square feet of impervious areas.

There are no bridges within the subwatershed on state highways, excluding County or other roads. There are no known archaeological, cultural, or historical resources within the subwatershed.

The subwatershed has 17 wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with bacteria and pH within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016). There are no state cleanup site listings within the sub watershed. There are no dams within the subwatershed.

Washougal River Reach #9

This reach has 1.70 total stream miles under shoreline jurisdiction and 77.16 acres of shoreline jurisdictional area. The existing land use within this reach is 44.7 percent residence or accommodation functions, 29.8 percent mining and extraction establishments, 17.2 percent agriculture, forestry, fishing and hunting, 6.5 percent undefined, 1.5 percent government services, and 0.3 percent arts, entertainment, and

recreation. Approximately 92percent of the reach is privately owned and 8. percent is publicly owned. In terms of zoning, the reach is 98.4 percent residential – higher density, 1.5 commercial, and 0.03 percent residential – lower density.

There are approximately 0.42 miles of roads within the reach. It has approximately 43,496 square feet of impervious surface of structures and 79,164 square feet of impervious road surfaces, for a total of 122,660 square feet of impervious areas. This reach has wellhead protection areas. There area two 303(d) listings associated with bacteria and pH within the reach. No additional altered conditions are known to be present within this reach.

4.3.5.6 Public Access

The subwatershed has no known trails, boat ramps, golf courses, or parks.

4.3.5.7 Restoration Opportunities

The Lower Washougal River provides critical habitat for fall Chinook. Restoration and protection habitat measures in the lower mainstem will involve protecting the remaining functional habitat, riparian restoration, stormwater controls, and measures that address the potential impacts from expanding urban and suburban development (Lower Columbia Fish Recovery Board 2006).

4.3.6 Tanner Creek - Columbia River (170800010801) – Map Sheets 5c, 5f, and 5g

4.3.6.1 Overview

The Tanner Creek – Columbia River (170800010801) hydrologic unit is approximately 15,145 total acres, including 854.86 acres of shoreline jurisdictional area and 12.95 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 45.6416/-121.9776, and its upstream location is 45.7041/-122.0150. This HUC flows directly into the Columbia River and includes the Columbia River from the Bonneville Dam downstream to Ives Island. The northern extent of the HUC is located on the west flank of Table Mountain and approximately 6 miles north of North Bonneville. The City of North Bonneville boundary is landward of the Columbia River and the City has not predesignated its NSA Urban Area per WAC 173-26-150. Therefore, this subwatershed includes an area of County jurisdiction along the Columbia River not within the City of North Bonneville, and extends to the midline of the Columbia River.

Columbia River at North Bonneville – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

4.3.6.2 Reaches

Greenleaf Creek: This reach originates at the 20 cfs upstream point on the south flank of Table Mountain and ends approximately 2 miles downstream at the northern edge of the City of North Bonneville. Its downstream location is 45.6416/-121.9776, and its upstream location is 45.6718/-121.9593. This reach is not a shoreline of statewide significance.

Hamilton Creek #1: This reach originates on the west flank of Table Mountain and ends approximately 6 miles downstream at the northern edge of the City of North Bonneville. Its downstream location is 45.6416/-121.9776 and its upstream location is 45.7041/-121.0150. This reach is not a shoreline of statewide significance.

Hamilton Creek #2: This reach originates at the City of North Bonneville city limits and ends at its intersection with the Columbia River. The area along the southeastern side of the reach is within the County's jurisdiction, while the northwestern side is within the jurisdiction of the City of North Bonneville. Its downstream location is 45.6277/-121.9947 and its upstream location is 45.6416/-121.9776. This reach is not a shoreline of statewide significance.

Columbia River Reach #14: This reach originates at Bonneville Dam and ends approximately 3.6 miles downstream and includes the confluence with Hamilton Creek. Its downstream location is 45.6188/-121.9987, and its upstream location is 45.6447/-121.9408. This reach is a shoreline of statewide significance.

Columbia River Reach #15: This reach includes approximately 70 feet of upland shoreline that runs parallel along the Columbia River that is not within North Bonneville. This reach includes Ives Island, and its associated wetlands and open water. Its downstream location is 45.6186/-121.9990, and its upstream location is 45.6188/-121.9987. This reach is a shoreline of statewide significance.

4.3.6.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soils types of the subwatershed is listed in Table 4-59.

Table 4-59. Surficial Geology and Soil Types - Tanner Creek – Columbia River (170800010801)

Type	Percent
Surficial Geology	
Continental sedimentary deposits or rocks, conglomerate	43.2%
Mass-wasting, mostly landslides	25.8%
Andesite flows	10.3%
Alluvium	7.4%
Basalt flows (grand ronde basalt, upper flows of norm. mag. pol.)	5.6%
Water	3.3%
Basalt flows (grand ronde, upper flows of re. mag. pol.)	2.6%
Basic (mafic) intrusive rocks	1.2%
Basalt flows, basaltic andesite flows, and artificial fill, including modified land	Less than 1% each
Soil Types	
Zygore gravelly loam, 30 to 65 % slopes	23.4%
Steever stony clay loam, 2 to 30 % slopes	14.9%
Aschoff very gravelly loam, 30 to 65 % slopes	14.0%
Rock outcrop-rubbleland complex	7.0%
Steever stony clay loam, 30 to 65 % slopes	6.8%
Zygore gravelly loam, 5 to 30 % slopes	6.5%
Andic cryumbrepts, 5 to 65 % slopes	4.7%
Arents, 0 to 5 % slopes	4.4%
Xerorthents-rock outcrop complex, 50 to 90 % slopes	3.8%
Water	3.7%
Aschoff very gravelly loam, 5 to 30 % slopes	2.7%
Steever-rock outcrop complex, 30 to 65 % slopes	2.6%
Pilchuck very fine sandy loam	2.1%
Bonneville stony sandy loam	1.7%
Aschoff-rock outcrop complex, 30 to 65 % slopes; Zygore-rock outcrop complex, 30 to 65 % slopes; Riverwash; Mcbee silt loam; Steever-rock outcrop complex, 2 to 30 % slopes; Pits; Typic dystrandepts, 5 to 65 % slopes	Less than1% of each

Vegetated cover within the subwatershed is composed of 4.86 percent agriculture, 1.96 percent developed other human use, 73.96 percent forested woodland, 0.11 percent nonvascular or sparse vascular rock vegetation, 3.49 percent open water,

6.38 percent recently disturbed or modified land, and 9.22 percent shrubland and/or grassland.

The subwatershed has a total of 679 acres of 100-year FEMA floodplain and approximately 3,903 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

4.3.6.4 Biological Resources

The PHS priority habitat types within the subwatershed include riverine wetland, freshwater forested/shrub wetland, freshwater emergent wetland, freshwater pond, lake, "other" type of wetland, bald eagle, cliffs/bluffs, elk, herbaceous bald, oak woodland, and talus slopes. The PHS species within the subwatershed include northern spotted owl, bald eagle, peregrine falcon, Larch Mountain salamander, and Cascade torrent salamander. The monitored non-PHS species within the subwatershed include tailed frog, racer, ringneck snake, Cope's giant salamander, osprey, great gray owl, and Cascades frog.

Approximately 17.08 stream miles of coastal cutthroat, 9.27 stream miles of coho, 8.37 stream miles of Lower Columbia Gorge fall chum, 8.16 stream miles of Hamilton Creek winter steelhead, 5.38 stream miles of Bonneville bright fall Chinook, and 4.43 stream miles of Hanford reach fall Chinook.

A total of 825 acres of NWI wetlands were identified within the subwatershed. These wetlands include 57.40 percent riverine wetland, 23.42 percent freshwater forested/shrub wetland, 5.24 percent freshwater emergent wetland, 4.94 percent freshwater pond, 4.68 percent lake, and 4.31 percent other.

4.3.6.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 72.79 percent government services; 17.93 percent mining and extraction establishments; 4.95 percent undefined; 2.26 percent residence or accommodation functions; 1.83 percent agriculture, forestry, fishing and hunting; and less than 1 percent of the following: construction related business; general sales or services; manufacturing and wholesale trade; arts, entertainment, and recreation; and transportation, communication, information, and utilities. Approximately 23.59 percent of the subwatershed is privately owned and 76.41 percent is publicly owned. In terms of zoning, the watershed is 56.73 percent forest; 33.4 percent open space/conservancy; 3.27 percent unzoned; 2.97 percent water; 1.94 percent commercial; and less than 1 percent of the following: residential – higher density, industrial, public recreation, government/service, and agriculture.

The subwatershed has approximately 86.08 miles of roads with a road density of 3.64 miles per square mile. The subwatershed has approximately 1,723,689 square feet of impervious structural surfaces and 13,992,528 square feet of impervious road surfaces for a total of 15,716,217 square feet of impervious surfaces. The subwatershed has no bridges on state highways.

Known archaeological, cultural, or historical resources within the subwatershed include three historic properties, 114 archaeological sites, 13 cemeteries, and 14 historic districts.

There are no wellhead protection areas associated with Group A and Group B wells in the subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with temperature and dioxin and two state cleanup site listings within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016). Bonneville Dam on the Columbia River is within the subwatershed.

Greenleaf Creek

This reach has 2.78 total stream miles under shoreline jurisdiction and 56.54 acres of shoreline jurisdictional area. The existing land uses within this reach are 54.8 percent government services, 41.7 percent mining and extraction establishments, and 3.5 percent agriculture, forestry, fishing and hunting. Approximately 45.2 percent of the reach is privately owned and 54.8 percent is publicly owned. In terms of zoning, the reach is 100 percent forest. There are no impervious surfaces for structures and roads within the reach's shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Hamilton Creek #1

This reach has 5.1 total stream miles under shoreline jurisdiction and 256.83 acres of shoreline jurisdictional area. The existing land uses within this reach are 94.32 percent government services; 4.59 percent mining and extraction establishments; and 1.09 percent undefined. Approximately 4.61 percent of the reach is privately owned and 95.39 percent is publicly owned. In terms of zoning, the reach is 60.19 percent forest; 38.56 percent open space/conservancy; 1.25 percent public recreation; and less than 1 percent of the following: commercial and industrial. There are approximately 0.17 miles of roads within the reach's shoreline jurisdiction. It has approximately 27,349 total square feet of impervious road surfaces and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Hamilton Creek Reach #2

This reach has a total of 1.5 total stream miles under shoreline jurisdiction and 17.07 acres of shoreline jurisdictional area. The existing land uses within this reach area are 99.7 percent government services and 0.3 percent undefined. Approximately 95.4 percent of the reach is publicly owned and 4.6 percent is privately owned. In terms of zoning, the reach is 78.6 percent unzoned and 21.4 percent open space/conservancy. There is not known impervious road surfaces or impervious structural surfaces within the reach. No additional altered conditions are known to be present within this reach.

Columbia Reach #14

This reach has 0.02 total stream miles under shoreline jurisdiction and 495.16 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent undefined. One hundred percent of the reach is publicly owned. In terms of zoning, the reach is 94.27 percent open space/conservancy, and 5.73 percent water. There are no impervious surfaces for structures and roads within the reach's shoreline jurisdiction. A large amount of fill was placed in this reach to form dry land for the relocation of the City of North Bonneville, which resulted in changes to surface and ground hydrology. Additional altered conditions within this reach include the presence of Bonneville Power Administration (BPA) infrastructure, fish ladder, roads, structures, trails, in-water structures, boat ramp, pier, dock, parking lots, etc. There is a state cleanup site and two 303(d) listings associated with temperature and dioxin within the reach. No additional altered conditions are known to be present within this reach.

Columbia River #14

This reach has 3.56 total stream miles under shoreline jurisdiction and 495.16 acres of shoreline jurisdictional area. The existing land uses within this reach are 73.3 percent undefined, 25.7 percent government services, and 1.0 percent agriculture, forestry, fishing and hunting. Approximately 7.9 percent of the reach is privately owned and 92.1 percent is publicly owned. In terms of zoning, the reach is 58.9 percent water, 25 percent open space/conservancy, and 16.1 unzoned.

There are approximately 2.03 miles of roads within the reach's shoreline jurisdiction. It has approximately 84,100 square feet of impervious structural surface and 331,646 square feet of impervious road surfaces for a total of 415,747 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

4.3.6.6 Public Access

The subwatershed has 11.68 miles of trails, including the Pacific Crest Trail, the Bonneville Trailhead located north of SR 14, and trails around Hamilton Island accessed from Dam Access Road. The fish ladder at Bonneville Dam contains public access to the fish ladder used for fish migration up and down the Columbia River. The Columbia River (Reaches #14 and #15) are accessible from Dam Access Road off SR 14. North Bonneville Boat Ramp is also located from Dam Access Road.

4.3.6.7 Restoration Opportunities

Ecological functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with temperature and dioxin within the subwatershed. Potential restoration opportunities include riparian and floodplain restoration as well as addressing sediment inputs in the upper reaches (Lower Columbia Fish Recovery Board 2006).

4.3.7 Hamilton Creek-Columbia River (170800010802) – Map Sheets 5f and 5g

4.3.7.1 Overview

The Hamilton Creek-Columbia River (170800010802) HUC is approximately 17,994 total acres, and includes 2,506.23 acres of shoreline jurisdictional area and 13.31 miles of streams under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 45.5841/-122.1007, and its upstream location is 45.6455/-122.0571. The northern extent of the HUC is located approximately 3 miles east of Archer Mountain and 3 miles north of the community of Skamania along Woodward Creek Road. The southern extent of the HUC is the Columbia River extending from North Bonneville to the non-jurisdictional Gable Creek at approximately milepost 30 on SR 14.

Columbia River with Beacon Rock and Pierce Island – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

4.3.7.2 Reaches

Woodward Creek: This reach originates approximately 3 miles north of the community of Skamania along Woodward Creek Road and the ends at the confluence with the Columbia River Reach #17. Its downstream location is 45.6198/-122.0199, and its upstream location is 45.6455/-122.0571. This reach is not a shoreline of statewide significance.

Duncan Creek: This reach originates approximately 3 miles north of Archer Mountain and feeds into Woody's Lake. Its downstream location is 45.6131/-122.0514, and its upstream location is 45.6635/-122.0866. This reach is not a shoreline of statewide significance.

Columbia River Reach #16: This reach originates west of North Bonneville and ends approximately 426 feet downstream on the Columbia River. Its downstream location is 45.6181/-122.0004, and its upstream location is 45.6186/-121.9990. This reach is a shoreline of statewide significance.

Columbia River Reach #17: This reach originates at the downstream extent of Reach #16 and ends approximately 1.92 stream miles downstream on the Columbia River. This reach includes Pierce Island, and its associated wetlands and open water. Its downstream location is 45.6114/-122.0384, and its upstream location is 45.6180/-122.0004. This reach is a shoreline of statewide significance.

Columbia River Reach #18: This reach originates at the downstream end of Reach #17 and ends approximately 0.60 stream miles downstream on the Columbia River. Its downstream location is 45.6077/-122.0495, and its upstream location is 45.6114/-122.0384. This reach is a shoreline of statewide significance.

Columbia River Reach #19: This reach originates at the downstream end of Reach #18 and ends approximately 2.97 stream miles downstream on the Columbia River. Its downstream location is 45.5841/-122.1007, and its upstream location is 45.6077/-122.0495. This reach is a shoreline of statewide significance.

Woody's Lake: This lake is located in the community of Skamania, between SR 14 and the Columbia River, and is fed by Duncan Creek. The center of this waterbody is at 45.6047/-122.0451. This reach is not a shoreline of statewide significance.

Franz Lake: This lake is located within the Franz Lake National Wildlife Refuge between SR 14 and the Columbia River, approximately 2 miles west of the community of Skamania. The center of this waterbody is at 45.6041/-122.0800. This reach is not a shoreline of statewide significance.

4.3.7.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-60. It also includes approximately 8,132 acres of landslide hazard zones.

Table 4-60. Surficial Geology and Soil Types - Hamilton Creek-Columbia River (170800010802)

Type	Percent
Surficial Geology	
Mass-wasting deposit, mostly landslides	45.20%
Continental sedimentary deposits or rocks, conglomerate	14.04%
Tuffs and tuff breccias	9.85%
Andesite flows	9.12%
Water	8.10%
Alluvium	7.95%
Grande Ronde basalt flows	5.41%

Type	Percent
Basalt flows	0.33%
Soil Types	
Steever stony clay loam, 30 to 65 % slopes	16.28%
Zygore gravelly loam, 30 to 65 % slopes	13.07%
Steever stony clay loam, 2 to 30 % slopes	12.88%
Water	9.21%
Skoly stony loam, 30 to 65 % slopes	6.75%
Zygore gravelly loam, 5 to 30 % slopes	6.65%
Andic Cryumbrepts, 5 to 65 % slopes	5.81%
Aschoff very gravelly loam, 30 to 65 % slopes	5.06%
McBee silt loam	2.92%
Skoly stony loam, 2 to 15 % slopes	2.62%
Skamania very fine sandy loam, 8 to 15 % slopes	2.24%
Skoly stony loam, 15 to 30 % slopes	2.11%
Rock outcrop-Rubbleland complex	2.06%
Mountzion clay loam, 2 to 15 % slopes	1.92%
Zygore-Rock outcrop complex, 30 to 65 % slopes	1.47%
Bonneville stony sandy loam	1.29%
Aschoff very gravelly loam, 5 to 30 % slopes	1.26%
Skamania very fine sandy loam, 15 to 30 % slopes	1.15%
Pilchuck very fine sandy loam; Mountzion clay loam, 15 to 30 % slopes; Riverwash; Steever-Rock outcrop complex, 30 to 65 % slopes; McDoug silt loam; Skoly-Rock outcrop complex, 30 to 65 % slopes; Skamania very fine sandy loam, 0 to 8 % slopes; Rock outcrop-Xerorthents complex, 50 to 90 % slopes; Skoly-Rock outcrop complex, 5 to 30 % slopes; Steever-Rock outcrop complex, 2 to 30 % slopes; and Aschoff-Rock outcrop complex, 30 to 65 % slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 66.6 percent forested woodland, 14.35 percent recently disturbed or modified land, 8.33 percent open water, 8.15 percent shrubland and/or grassland, 2.31 percent agriculture, and 0.27 percent developed other human use. The subwatershed also includes a total of 2,347 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.3.7.4 Biological Resources

The PHS priority habitat types within the subwatershed include riverine wetland, freshwater forested/shrub wetland, freshwater emergent, lake, freshwater pond, bald eagle, cliffs/bluffs, herbaceous bald, talus slopes, as well as identified habitat for elk, waterfowl concentrations, western Canada goose, purple martin, and tundra swan. The PHS species within the subwatershed include northern spotted owl, bald eagles, Pacific pond turtle, western toad, peregrine falcon, Pacific lamprey, Larch mountain salamander, purple martin, leopard dace, Cascade torrent salamander, and great blue heron. The monitored non-PHS species within the subwatershed include the tailed frog, racer, ringneck snake, osprey, and Cascades frog.

Approximately 14.8 stream miles of coastal cutthroat, 12.72 stream miles of Lower Columbia Gorge fall chum, 8.65 stream miles Bonneville tributaries coho, 7.0 stream miles of Bonneville bright fall Chinook, and 5.53 stream miles of Hanford Reach fall Chinook are found within the subwatershed.

A total of 2,177 acres of NWI wetlands were identified within the subwatershed. These wetlands include 68.68 percent riverine wetland, 18.1 percent freshwater forested/shrub wetland, 9.34 percent freshwater emergent wetland, 3.49 percent lake, and less than 1 percent of freshwater pond.

4.3.7.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 63.48 percent government services, 13.27 percent mining and extraction establishments, 10.44 percent residence or accommodation functions, 9.51 percent undefined, 3.25 percent agriculture, forestry, fishing and hunting, and less than 1 percent of the following: manufacturing and wholesale trade; transportation, communication, information, and utilities; arts, entertainment, and recreation; and construction-related business. Approximately 26.71 percent of the subwatershed is privately owned and 73.29 percent is publicly owned. In terms of zoning, the watershed is 76.22 percent forest, 10.38 percent open space/conservancy, 6.98 percent water, 4.84 percent residential – higher density, and less than 1 percent of the following: public recreation, commercial, agriculture, unzoned, industrial, and government/services.

The subwatershed has approximately 96.92 miles of roads with a road density of 3.45 miles per square mile. The subwatershed has approximately 871,056 square feet of impervious structural surfaces and 16,684,898 square feet of impervious road surfaces for a total of 17,555,954 square feet of impervious surfaces. The subwatershed has 2 bridges on state highways, excluding County or other roads, and include Duncan Creek Bridge and Woodward Creek Bridge.

Known archaeological, cultural, or historical resources within the subwatershed include 13 historic properties and 24 archaeological sites.

The subwatershed has 22 wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the three 303(d) listings associated with temperature and three listings associated with total dissolved gas within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016). There are no state cleanup site listings within the watershed.

The dams within the subwatershed include Woodard Skamania Landing Dam (45.6158/-122.041) which is located at the downstream side of Woodward Lake; B & W Pond Dam No. 1 (45.6548/-122.0429) and located on an unnamed tributary

along Kueffler Road approximately 1.4 miles upstream from the confluence with Woodward Creek; and B & W Pond Dam No. 3 (45.6515/-122.0462) is located approximately 600 feet downstream from B & W Pond Dam No. 1.

Woodward Creek

This reach has 2.85 total stream miles under shoreline jurisdiction and 141 acres of shoreline jurisdictional area. The existing land uses within this reach are 93.87 percent government services, 3.52 percent residence or accommodation functions, and 2.61 percent undefined. Approximately 2.76 percent of the reach is privately owned and 97.24 percent is publicly owned. In terms of zoning, the reach is 88.49 percent forest, 7.77 percent public recreation, 2.72 percent residential – higher density, and 1.03 percent open space/conservancy.

There are approximately 1.01 miles of roads within the reach's shoreline jurisdiction. It has approximately 1,289 square feet of impervious structural surfaces and 172,439 square feet of impervious road surfaces for a total of 173,728 square feet of impervious surfaces. There are wellhead protection areas within this reach. No additional altered conditions are known to be present within this reach.

Duncan Creek

This reach has 4.89 total stream miles under shoreline jurisdiction and 273.24 acres of shoreline jurisdictional area. The existing land uses within this reach are 36.68 percent government services, 23.06 percent mining and extraction establishments, 21.03 residence or accommodation functions, 15.96 agriculture, forestry, fishing and hunting, 3.26 percent undefined, and less than 1 percent of construction-related business. Approximately 60.06 percent of the reach is privately owned and 39.94 percent is publicly owned. In terms of zoning, the reach is 87.91 percent forest, 9.85 percent residential – higher density, 1.87 percent commercial, and less than 1 percent of agriculture and open space/conservancy.

There is approximately 1 mile of roads within the reach's shoreline jurisdiction. It has approximately 10,386 square feet of impervious structural surface and 165,555 square feet of impervious road surfaces for a total of 175,941 square feet of impervious surfaces. There are wellhead protection areas within this reach. No additional altered conditions are known to be present within this reach.

Columbia River Reach #16

This reach has 0.08 total stream miles under shoreline jurisdiction and 28.82 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent undefined and is entirely publicly owned. In terms of zoning, the reach is 69.01 percent open space/conservancy and 30.99 percent water. There are no impervious surfaces for structures and roads within the reach. No additional altered conditions are known to be present within this reach.

Columbia River Reach #17
This reach has 1.92 total stream miles under shoreline jurisdiction and 614 acres of shoreline jurisdictional area. The existing land uses within this reach are 76.71 percent undefined, 13.27 percent government services, and 10.02 percent agriculture, forestry, fishing and hunting. Approximately 10.02 percent of the reach is privately owned and 89.98 percent is publicly owned. In terms of zoning, the reach is 59.71 percent open space/conservancy, 37.14 percent water, and 3.15 percent public recreation. There are approximately 0.72 miles of roads within the reach's shoreline jurisdiction. It has approximately 114,369 total square feet of impervious road surfaces. This reach has two State 303d listings associated with temperature and total dissolved gas. No additional altered conditions are known to be present within this reach.

Columbia River Reach #18
This reach has 0.6 total stream miles under shoreline jurisdiction and 77.71 acres of shoreline jurisdictional area. The existing land uses within this reach are 85.33 percent undefined, 11.78 percent residence or accommodation functions, 1.79 percent agriculture, forestry, fishing and hunting, and 1.10 percent government services. Approximately 13.57 percent of the reach is privately owned and 86.43 percent is publicly owned. In terms of zoning, the reach is 79.67 percent water, 18.14 percent residential – higher density, 1.24 percent open space/conservancy, and 0.95 percent agriculture.

There are approximately 0.31 miles of roads within the reach's shoreline jurisdiction. It has approximately 73,711 square feet of impervious structural surfaces and 47,167 square feet of impervious road surfaces for a total of 120,878 square feet of impervious surfaces. This reach has two State 303d listings associated with temperature and total dissolved gas. No additional altered conditions are known to be present within this reach.

Columbia River Reach #19
This reach has 2.97 total stream miles under shoreline jurisdiction and 273 acres of shoreline jurisdictional area. The existing land uses within this reach are 83.76 percent undefined and 16.24 percent government services. One hundred percent of the reach is publicly owned. In terms of zoning, the reach is 90.48 percent water and 9.52 percent open space/conservancy. There are approximately 0.01 miles of roads within the reach's shoreline jurisdiction. It has approximately 1,541 total square feet of impervious road surfaces. This reach has two State 303d listings associated with temperature and two listings associated with total dissolved gas. No additional altered conditions are known to be present within this reach.

Franz Lake
This reach has a total of 107 acres and 265 acres of jurisdictional area. The existing land uses within this reach are 96.5 percent government services, 1.8 percent

residence or accommodation functions, and 1.7 percent undefined. Approximately 1.8 percent of the reach is privately owned and 98.2 percent is publicly owned. In terms of zoning, the reach is 96 percent open space/conservancy, 2.4 percent agriculture, and 1.7 percent forest.

The reach has approximately 0.24 miles of roads and a road density of 0.59 miles per square mile. It has approximately 2,229 square feet of impervious structural surface and 43,262 square feet of impervious road surfaces for a total of 43,491 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Franz Lake – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

Woody's Lake

This reach has a total of 30.24 acres and 96.80 acres of jurisdictional area. The existing land uses within this reach are 55.95 percent agriculture, forestry, fishing and hunting, 20.58 government services, 19.06 percent undefined, 3.96 percent residence or accommodation functions, and 0.46 percent construction-related business. Approximately 60.37 percent of the reach is privately owned and 39.63 percent is publicly owned. In terms of zoning, the reach is 45.49 percent water, 33.86 percent residential – higher density, 13.99 percent open space/conservancy, 5.46 percent public recreation, 1.15 percent commercial, and less than 1 percent forest.

The reach has approximately 0.87 miles of roads and a road density of 5.73 miles per square mile. It has approximately 26,849 square feet of impervious structural

surfaces and 173,738 square feet of impervious road surfaces for a total of 200,587 square feet of impervious surfaces.

Woody's Lake – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

4.3.7.6 Public Access

The subwatershed includes Beacon Rock State Park, Pierce national Wildlife Refuge, and Franz Lake National Wildlife Refuge. It has 20.12 miles of trails and there is one boat ramp located at Beacon Rock State Park. The northernmost sections of the subwatershed are difficult to access using logging, county, or state forest roads. The southern portion of the subwatershed is accessible from the SR 14 corridor and Columbia River is accessible from local surface streets, Beacon Rock State Park and both wildlife refuges.

Boat ramp at Beacon Rock State Park (Skamania County 2015a)

4.3.7.7 Restoration Opportunities

Potentially good spawning habitat has been impacted by the development around the City of North Bonneville and by SR 14. Spawning habitat for chum and coho as well as for fall Chinook and winter steelhead in Duncan Creek is located just above Woody's Lake. Additionally, ecological functions have been significantly altered and/or adversely impacted according to the three 303(d) listings associated with temperature within the subwatershed. Access to spawning areas in Duncan Creek has been improved by the construction of a dam that lowers lake levels during salmonid migration periods. Restoration opportunities include riparian and floodplain restoration, addressing sediment inputs, and land use planning to protect habitat forming processes in sensitive areas (Lower Columbia Fish Recovery Board 2006).

4.3.8 Viento Creek – Columbia River (170800010803) – Map Sheets 5e and 5f

4.3.8.1 Overview

The Viento Creek – Columbia River (170800010803) HUC is approximately 15,145 total acres and includes 1,622 acres of shoreline jurisdictional area and 5.04 stream miles under shoreline jurisdiction. Using the WGS 84, the subwatershed's downstream location is 45.5677/-122.1975, and its upstream location is 45.5841/-122.1007. The upland side of this HUC is generally on the south flank of Archer Mountain with the Columbia River as the southern boundary. This south

boundary is approximately 6 stream miles of the Columbia River, starting from the non-jurisdictional Gable Creek (SR 14, MP 30) as the upstream extent and ending at Cape Horn Falls as the downstream extent.

Community of Prindle and Columbia River shoreline – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

4.3.8.2 Reaches

Columbia River Reach #20: This reach originates approximately at the confluence of Gable Creek (SR 14, MP 30) with the Columbia River and ends two miles downstream at the intersection of Prindle Road and SR 14. Its downstream location is 45.5824/-122.1417, and its upstream location is 45.5841/-122.1007. This reach is a shoreline of statewide significance.

Columbia River Reach #21: This reach originates approximately at the intersection of Prindle Road and SR 14 and extends downstream on the Columbia River approximately 1.18 stream miles to the west. Its downstream location is 45.5801/122.1653, and its upstream location is 45.5824/-122.1417. This reach is a shoreline of statewide significance.

Columbia River Reach #22: This reach originates from the downstream end of Reach #21 and ends at Cape Horn Falls, 1.84 stream miles downstream. Its downstream

location is 45.5877/-122.1975, and its upstream location is 45.5801/-122.1653. This reach is a shoreline of statewide significance.

Unnamed Waterbody: This body of water is located between SR 14 and the Columbia River at Fir Point (Columbia River RM 136). The center of this waterbody is at 45.5936/-122.1307. This reach is not a shoreline of statewide significance.

4.3.8.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-61. The subwatershed also includes approximately 2,786 acres of landslide hazard zones.

Table 4-61. Surficial Geology and Soil Types - Viento Creek – Columbia River (170800010803)

Type	Percent
Surficial Geology	
Mass-wasting deposits, mostly landslides	43.27%
Grand Ronde basalt flows	21.54%
Water	18.31%
Alluvium	6.74%
Andesite flows	6.09%
Basalt flows (Frenchman Springs Member [CRB, WB])	3.35%
Continental sedimentary deposits or rocks	Less than 1%
Soil Types	
Water	21.27%
Skoly stony loam, 30 to 65 % slopes	15.76%
Skoly stony loam, 2 to 15 % slopes	13.48%
Skoly stony loam, 15 to 30 % slopes	9.20%
Rock outcrop-Xerorthents complex, 50 to 90 % slopes	7.61%
Steever-Rock outcrop complex, 30 to 65 % slopes	5.47%
Skamania very fine sandy loam, 0 to 8 % slopes	4.31%
Rock outcrop-Rubbleland complex	3.55%
Steever stony clay loam, 30 to 65 % slopes	2.83%
Skelida silt loam, 15 to 30 % slopes	2.54%
Skoly-Rock outcrop complex, 30 to 65 % slopes	2.48%
McBee silt loam	2.32%
Steever stony clay loam, 2 to 30 % slopes	2.02%
Mountzion clay loam, 15 to 30 % slopes	1.88%
Skamania very fine sandy loam, 8 to 15 % slopes	1.50%
Skelida silt loam, 5 to 15 % slopes	1.49%
Skamania very fine sandy loam, 15 to 30 % slopes	1.12%
Pilchuck very fine sandy loam; Mountzion clay loam, 30 to 65 % slopes; Bannel cindery sandy loam, 5 to 30 % slopes; Mountzion clay loam, 2 to 15 % slopes; and Riverwash	Less than 1% each

Vegetated cover within the subwatershed is composed of 2.58 percent agriculture, 0.61 percent developed other human use, 60.82 percent forested woodland,

21.68 percent open water, 12.84 percent recently disturbed or modified land, and 1.47 percent shrubland and/or grassland. The subwatershed also includes a total of 1,587 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.3.8.4 Biological Resources

The PHS priority habitat types within the subwatershed include riverine wetland, freshwater forested/shrub wetland, freshwater emergent wetland, freshwater pond, cliffs/bluffs, talus slopes, herbaceous bald, and oak woodland as well as habitat for bald eagle, western Canada goose, and waterfowl concentrations. The PHS species within the subwatershed include bald eagles, peregrine falcon, Larch Mountain salamander, and purple martin. The monitored non-PHS species within the subwatershed include osprey, sand roller, and ringneck snake.

Approximately 7.92 stream miles of Lower Columbia Gorge fall chum and 4.94 stream miles for both the Bonneville bright fall Chinook and Hanford reach fall Chinook are found within the subwatershed.

A total of 1,491 acres of NWI wetlands were identified within the subwatershed. These wetlands include 92.61 percent riverine wetland, 6.15 percent freshwater forested/shrub wetland, 1.18 percent freshwater emergent wetland, and less than 1 percent freshwater pond.

4.3.8.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 46.35 percent government services, 25.07 percent undefined, 12.52 percent residence or accommodation functions, 9.62 percent mining and extraction establishments, and 6.43 percent agriculture, forestry, fishing and hunting. Approximately 27.07 percent of the subwatershed is privately owned and 72.93 percent is publicly owned. In terms of zoning, the watershed is 53.37 percent forest, 20.97 percent water, 17.6 percent open space/conservancy, 4.59 percent residential – higher density, 3.31 percent agriculture, and less than 1 percent for both residential – lower density and unzoned.

The subwatershed has approximately 23.37 miles of roads and a road density of 2.32 miles per square mile. The subwatershed has approximately 423,356 square feet of impervious structural surfaces and 4,660,537 square feet of impervious road surfaces for a total of 5,083,894 square feet of impervious areas. It has one bridge on state highways, excluding County or other roads, and includes the Cape Horn Slide Bridge.

Known archaeological, cultural, or historical resources within the subwatershed include 18 historic properties, 19 archaeological sites, and 3 cemeteries.

The subwatershed has four wellhead protection areas associated with Group A and Group B wells. There are no 303(d) listings and one state cleanup site listings within the watershed. There are no dams within the subwatershed.

Columbia Reach #20

This reach has 2.02 total stream miles under shoreline jurisdiction and 1,066 acres of shoreline jurisdictional area. The existing land uses within this reach are 93.47 percent undefined, 4.86 percent government services, and 1.67 percent residence or accommodation functions. This reach is entirely publicly owned. In terms of zoning, the reach is 86.08 percent water, 9.05 percent open space/conservancy, and 4.87 percent forest. There are approximately 0.02 miles of roads within the reach's shoreline jurisdiction. It has approximately 2,467 total square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

Columbia Reach #21

This reach has 1.18 total stream miles under shoreline jurisdiction and 297 acres of shoreline jurisdictional area. The existing land uses within this reach are 94.73 percent undefined, 5.17 percent residence or accommodation functions, and 0.11 percent government services. This reach is 95.61 percent publicly owned and 4.39 percent privately owned. In terms of zoning, the reach is 88.4 percent water, 11.58 percent residential – higher density, and less than 1 percent forest. There are no roads within the reach's shoreline jurisdiction but it has approximately 30,384 total square feet of impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Columbia Reach #22

This reach has 1.84 total stream miles under shoreline jurisdiction and 219 acres of shoreline jurisdictional area. The existing land uses within this reach are 80.12 percent undefined, 11.29 percent government services, 5.33 percent agriculture, forestry, fishing and hunting, 2.67 percent mining and extraction establishments, and less than 1 percent residence or accommodation functions. This reach is 91.41 percent publicly owned and 8.59 percent privately owned. In terms of zoning, the reach is 77.38 percent water, 17.35 percent forest, 5.08 percent open space/conservancy and less than 1 percent residential – higher density.

There are approximately 0.04 miles of roads within the reach's shoreline jurisdiction. It has approximately 3,615 square feet of impervious structural surfaces and 5,121 square feet of impervious road surfaces for a total of 8,736 total square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody

This waterbody is 15.08 acres is size and has 39.03 acres of jurisdictional area. The existing land uses within this reach are 99.35 percent residence or accommodation functions and 0.65 percent undefined. The reach is entirely publicly owned and 100 percent forest zoned. There are no roads or impervious surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.3.8.6 Public Access

The subwatershed has 4.72 miles of trails, including the St. Cloud Day Use/Picnic Area located off SR 14 on the Columbia River. Other portions of the Columbia River may be accessible surface streets in the community of Prindle and from Cape Horn Road off SR 14 (MP 26). The shoreline of the Columbia River within the subwatershed is generally obstructed by the BNSF rail line.

4.3.8.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally good, but the natural ecosystem processes such as hydrology and fish passage along these Columbia River reaches are impacted by the location of the BNSF railroad line and SR 14. Land use planning that is adequate to protect habitat forming processes in sensitive areas (i.e., wetlands, riparian areas, floodplains) will assist in the restoration along this Columbia River reach. Effective recovery measures include floodplain reconnection, riparian reforestation, and addressing upland sediment input. Specific restoration opportunities include eradicating invasive species and replanting with native trees and shrubs, removing bank armoring and addressing stormwater runoff from roads and bridges.

4.3.9 Latourell Creek-Columbia River Name (170800010804) – Map Sheet 5e

4.3.9.1 Overview

The Latourell Creek-Columbia (170800010804) hydrologic unit is approximately 3,418 total acres, and includes 483.88 acres of shoreline jurisdictional area and 2.82 miles of streams under shoreline jurisdiction. Using WGS 84, the subwatershed's downstream location is 45.55/-122.2492, and its upstream location is 45.5677/-122.1975. The HUC is located at the southwestern corner of WRIA 28 between Canyon Creek of the Lower Washougal River watershed (170800010606) to the north and the Columbia River to the south.

Cape Horn and Columbia River Shoreline - 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

4.3.9.2 Reaches

Columbia River Reach #23: From Cape Horn Falls on SR 14 to Point Vancouver approximately 3 miles to the west on SR 14. Its downstream location is 45.5500/-122.2492, and its upstream location is 45.5677/-122.1975. This reach is a shoreline of statewide significance.

4.3.9.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-62.

Table 4-62. Surficial Geology and Soil Types - Latourell Creek-Columbia (170800010804)

Type	Percent
Surficial Geology	
Andesite Flows	52.47%
Continental Sedimentary Deposits Or Rocks	30.13%
Water	12.13%
Alluvium	2.49%
Mass-Wasting Deposits, Mostly Landslides	1.32%
Grand Ronde Basalt Flows and Basalt Flows	Less than 1% each
Soil Types	
Skelida Silt Loam (5 to 15% slopes)	17.34%
Skelida Silt Loam (15 to 30% slopes)	16.57%
Hesson Clay Loam (30 to 40% slopes)	15.71%
Water	12.33%
Hesson Clay Loam (5 to 15% slopes)	11.40%

Type	Percent
Mountzion Clay Loam (30 to 65% slopes)	6.98%
Xerorthents-Rock Outcrop Complex (50 to 90% slopes)	6.36%
Hesson Clay Loam (15 to 30% slopes)	4.55%
Rock Outcrop-Xerorthents Complex (50 to 90% slopes)	3.28%
Skamania Very Fine Sandy Loam (30 to 40% slopes)	3.29%
Skoly Stony Loam (15 to 30% Slopes); Mountzion Clay Loam (15 to 30% Slopes); Mountzion Clay Loam (2 to 15% Slopes); And Rock Outcrop-Rubbleland Complex	Less than 1% each

The subwatershed has approximately 703.76 acres of landslide hazard zones and a total of 429.34 acres of 100-year FEMA floodplain.

Vegetated cover within the subwatershed is composed of 40.64 percent agriculture, 0.34 percent developed/other human use, 27.11 percent forested woodland, 13.59 percent open water, 18.12 percent recently disturbed or modified land, and 0.20 percent shrubland and/or grassland.

4.3.9.4 Biological Resources

The PHS priority habitat types within the subwatershed include riverine wetland, freshwater pond, oak woodland habitats, and talus slopes habitats. The PHS species within the subwatershed includes the peregrine falcon. The monitored non-PHS species within the subwatershed includes the sand roller.

Approximately 2.71 stream miles of Bonneville bright fall Chinook habitat, 2.71 stream miles of Hanford Reach fall Chinook habitat, 2.71 stream miles of Lower Columbia Gorge fall chum habitat, and 0.21 stream miles of Lewis coastal cutthroat habitat are found within the subwatershed.

A total of 419 acres of NWI wetlands were identified within the subwatershed. These wetlands include 99.79 percent riverine wetlands and 0.21 percent freshwater pond wetland.

4.3.9.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 41.70 percent residence or accommodation functions; 23.06 percent mining and extraction establishments; 14.81 percent undefined; 14.50 percent government services; 5.48 percent agriculture, forestry, fishing and hunting; and less than 1 percent of arts, entertainment, and recreation, and construction-related business. Approximately 70.73 percent of the subwatershed is privately owned and 29.27 percent is publicly owned. In terms of zoning, the watershed is 66.59 percent agriculture, 12.07 percent water, 8.44 percent of open space/conservancy, 6.93 percent residential – high density, 5.50 percent forest, and less than 1 percent of commercial and public recreation.

The subwatershed has approximately 17.48 miles of roads and a road density of 3.27 miles per square mile. It has approximately 515,750 square feet of impervious

structural surfaces and 3,296,638 square feet of impervious road surfaces for a total of 3,812,388 square feet of impervious areas. There are no bridges on state highways over jurisdictional waterbodies, excluding County or other roads, within the subwatershed.

Known archaeological, cultural, and historical resources within the subwatershed include 10 historic register properties, 22 archaeological sites, and seven cemeteries.

The subwatershed has four wellhead protection areas associated with Group A and Group B wells. There are no 303(d) listings and no state cleanup site listings within the subwatershed, and it contains no dams.

Columbia River #23

This reach has 2.82 total stream miles under shoreline jurisdiction and 483.88 acres of shoreline jurisdictional area. The existing land uses within this reach are 86.85 percent undefined, and 13.15 percent government services. All of the reach is publicly owned. In terms of zoning, the reach is 85.28 percent water, 14.18 percent open space/conservancy, and 0.53 percent forest. There are approximately 0.48 miles of roads within the reach and approximately 75,945 square feet of impervious road surfaces. No additional altered conditions are known to be present within this reach.

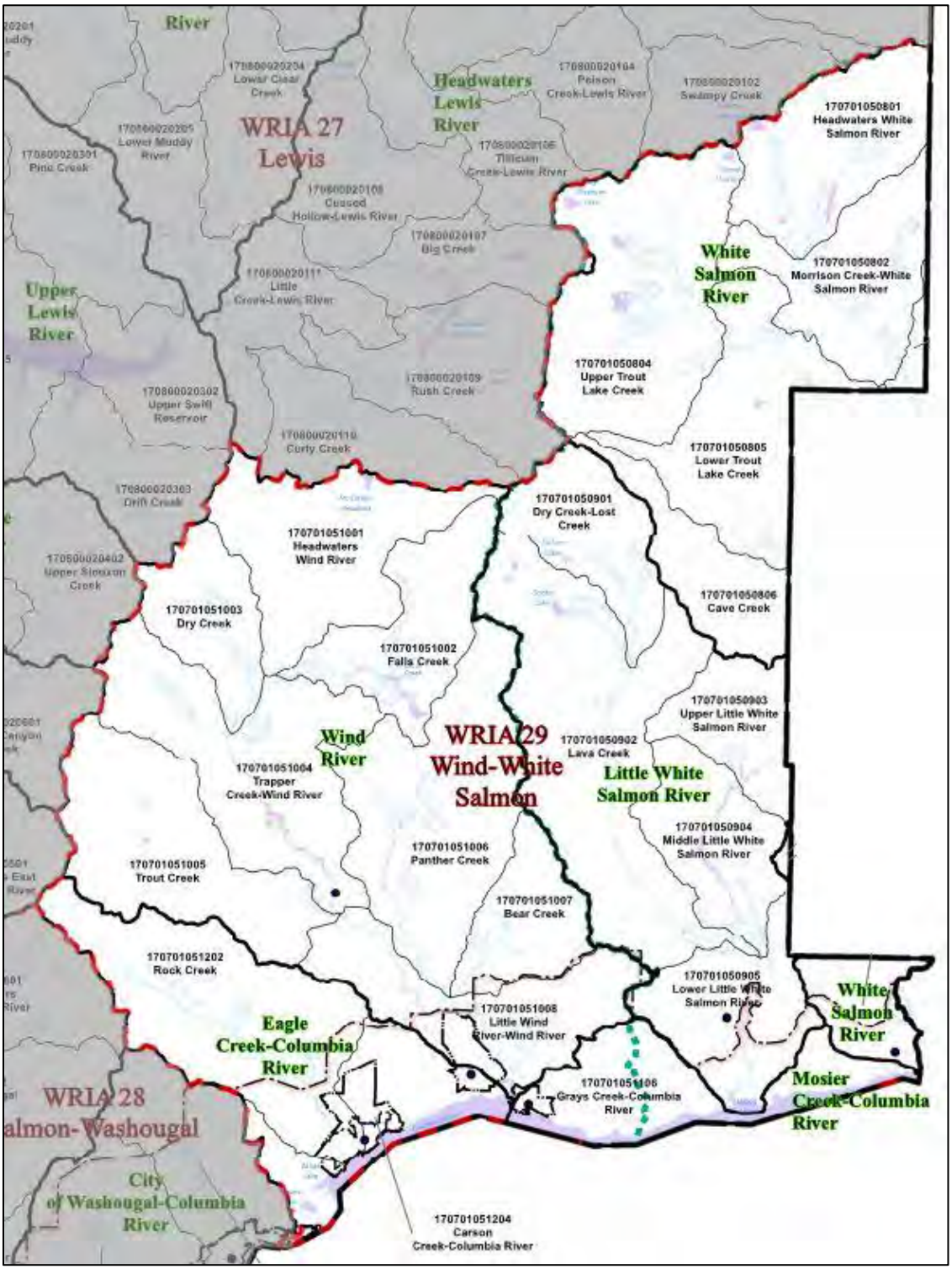
4.3.9.6 Public Access

The subwatershed has 1.18 miles of trails. The upstream extent of the subwatershed is readily accessible from Cape Horn Road and the Cape Horn Trail off SR 14.

4.3.9.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but the natural ecosystem processes such as hydrology and fish passage along this Columbia River reach are impacted by the location of the BNSF railroad line and SR 14 as well as by the dams on the Columbia River. Land use planning that is adequate to protect habitat forming processes in sensitive areas (i.e., wetlands, riparian areas, floodplains) will assist in the restoration along this Columbia River reach. Effective recovery measures include floodplain reconnection, riparian reforestation, and addressing upland sediment input. Specific restoration opportunities include eradicating invasive species and replanting with native trees and shrubs, removing bank armoring, removing old fencing for wildlife movement, and addressing stormwater runoff from roads and bridges (City of White Salmon 2015).

4.4 WRIA No. 29



WRIA 29 – Wind-White Salmon is approximately 902 square miles. Approximately 589 square miles of WRIA 29 are located within the County. The Wind and White Salmon rivers headwaters are located on the southwest flanks of Mount Adams, and

the rivers and their tributaries generally flow southward to the Columbia River. Approximately two-thirds of the WRIA is located within the Gifford Pinchot National Forest and a significant portion of the lower one-third is within the Columbia River Gorge National Scenic Area. The major surface waters of WRIA 29 that are located within the County include the Wind River, Eagle Creek, Rock Creek, White Salmon River, Little White Salmon River, and Mosier Creek. Some of the significant lakes located in WRIA 28 include Swampy Meadows, Big Mosquito Lake, Goose Lake, Drano Lake, Ashes Lake, and Wauna Lake.

WRIA 29 includes approximately 16,770.97 acres of shoreline jurisdictional area and 189.82 miles of streams under shoreline jurisdiction. This WRIA is mostly located on U.S. Forest land. Approximately 87 percent of the WRIA is publicly owned and 13 percent is privately owned. The existing land use within the WRIA includes approximately 85 percent government services (e.g., education, public administration, health care, government-owned national forest land), 7 percent mining and extraction establishments, 3 percent residence or accommodation functions, 2 percent agriculture, forestry, fishing, and hunting, 2 percent undefined land uses, and less than one percent of each of the following: general sales or services, manufacturing and wholesale trade, transportation, communication, information, utilities, arts, entertainment, and recreation, and construction-related businesses. It has approximately 19,124.28 acres of landslide hazard zones and 6,952.91 acres of FEMA 100-year floodplain.

The 2011 removal of the Condit Hydroelectric Dam, which was constructed in 1913 on the White Salmon River, is expected to provide access to approximately 32.4 miles of river and tributary habitat for steelhead and salmon; restore connectivity to spawning, rearing, foraging, and overwintering habitat for bull trout in the river; and have an overall potential of increased production for salmonids (Ecology 2010a). WDFW surveys from 2013 indicated that fall-run Chinook were spawning upstream of the former site of the dam (U.S. Geological Survey 2015).

4.4.1 Headwaters White Salmon River (170701050801) – Map Sheets 2 and 4

4.4.1.1 Overview

The Headwaters White Salmon River HUC (170701050801) is approximately 16,953.5 total acres with 797.38 acres of shoreline jurisdictional area, including 11.53 miles of shoreline jurisdictional streams and 40.08 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 46.1042/-121.6081. The subwatershed is within the Gifford Pinchot National Forest and borders Klickitat County to the east. Mount Adams is located northeast of the subwatershed.

4.4.1.2 Reaches

White Salmon River (Reach #1): This reach includes the White Salmon River headwaters until the confluence with Cascade Creek approximately 4.6 miles

downstream. Its downstream location is 46.1042 /-121.6081, and its upstream location is 46.1613/-121.6257. This reach is not a shoreline of statewide significance.

Cascade Creek (Reach #1): This is the headwater reach of Cascade Creek, which originates on the western flanks of Mount Adams. Its downstream location is 46.1545/-121.5705, and its upstream location is 46.1662/-121.5702. This reach is not a shoreline of statewide significance.

Cascade Creek (Reach #2): The middle reach of Cascade Creek spans from the confluence of Cascade Creek U T until the confluence of Salt Creek. Its downstream location is 46.1498/-121.5757, and its upstream location is 46.1545/-121.5705. This reach is not a shoreline of statewide significance.

Cascade Creek (Reach #3): This reach includes the lower reach of Cascade Creek until its confluence with the White Salmon River. Its downstream location is 46.1042/-121.6081, and its upstream location is 46.1498/-121.5757. This reach is not a shoreline of statewide significance.

Cascade Creek, U T: This reach includes a short segment tributary that flows northeast to southwest until its confluence with Cascade Creek. Its downstream location is 46.1545/-121.5705, and its upstream location is 46.1593/-121.5661. This reach is not a shoreline of statewide significance.

Salt Creek: Salt Creek is south of Cascade Creek U T and flows east to west from the western flanks of Mount Adams until its confluence with Cascade Creek. Its downstream location is 46.1498/-121.5757, and its upstream location is 46.1514/-121.5554. This reach is not a shoreline of statewide significance.

Swampy Meadows Lake: This shoreline waterbody is located approximately 7.5 miles west of Mount Adams, and is just west of the Pacific Crest Trail. The center of this waterbody is at 46.1652/-121.6371. This reach is not a shoreline of statewide significance.

4.4.1.3 Physical Environment

The subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-63.

Table 4-63. Surficial Geology and Soil Types - Headwaters White Salmon River (170701050801)

Type	Percent
Surficial Geology	
Andesite Flows	41.9%
Alpine Glacial Drift (Fraser-Age)	39.6%
Volcaniclastic Deposits or Rocks	13.4%
Basaltic Andesitic Flows	3.6%
Dacite Flows; Basalt Flows; Intrusive Rocks, Undivided; Ice; Alpine Glacial Drift (Pre-Fraser); and Water	Less than 1% each

Type	Percent
Soil Types	
Typic Vitricryands (PUM, M)	34.9%
Typic Vitricryands (PUM)	26.8%
Lithic Orthents, Andepts, Cryands, and Udands	14.9%
Aquic Vitricryands (Ashy/Med-SK)	7.9%
Typic Vitricryands (Ashy/Med-SK)	4.2%
Andic Cryumbrepts (Med/Lo-SK, M)	3.7%
Orthents, Andepts, And Cryands	2.7%
Aquic Vitricryands (PUM)	2.5%
Aquolls, Fibrists, And Aquods	2.3%
Orthents, Andepts, Cryands, and Udands; Lithic Orthents; and Typic Udivitrands (Cind/Med, Frag)	Less than 1% each

Vegetated cover within the subwatershed is composed of 78.4 percent forested woodland, 11.34 percent recently disturbed or modified land, 4.03 percent nonvascular or sparse vascular rock vegetation, 3.56 percent high montane vegetation, 1.34 percent shrubland and/or grassland, and 1.32 percent developed/other human use.

4.4.1.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/ shrub wetland, freshwater emergent wetland, freshwater pond, elk habitat. The only PHS species within the subwatershed is the northern spotted owl. The non-PHS species within the subwatershed include the Cascades frog.

A total of 519.79 acres of NWI wetlands were identified within the subwatershed. The total includes 82.7 percent freshwater forested/shrub wetland, 15.2 percent freshwater emergent wetland, and 2.1 percent freshwater pond.

4.4.1.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services. All of the subwatershed is publicly owned and it is entirely unzoned. The subwatershed has approximately 36.07 miles of roads and a road density of 1.36 miles per square mile. The subwatershed has approximately 5,939,447 square feet of impervious road surfaces and no impervious surfaces for structures. Known archaeological, cultural, or historical resources within the subwatershed include one historic property and 31 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

White Salmon River (Reach #1)

This reach has 4.58 total stream miles and 239.5 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly

owned and it is entirely unzoned. There are approximately 0.61 miles of roads within the reach and no additional impervious surfaces. No additional altered conditions are known to be present within this reach.

Cascade Creek (Reach #1)
This reach has 0.86 total stream miles and 40.92 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or structural surface within this reach. No additional altered conditions are known to be present within this reach.

Cascade Creek (Reach #2)
This reach has 0.46 total stream miles and 20.79 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or structural surface within this reach. No additional altered conditions are known to be present within this reach.

Cascade Creek (Reach #3)
This reach has a total of 4.13 jurisdictional stream miles and 300.07 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.12 miles of roads and 19,459 square feet of impervious road within the reach and no additional impervious surfaces. No additional altered conditions are known to be present within this reach.

Cascade Creek, U T
This reach has a total of 0.42 jurisdictional stream miles and 19.19 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or structural surface within this reach. No additional altered conditions are known to be present within this reach.

Salt Creek
This reach has a total of 1.09 jurisdictional stream miles and 52.66 acres of jurisdictional area. The existing land use within this reach is 100 percent government services. All of the reach is publicly owned and is entirely unzoned. There are no impervious roads or structural surface within this reach. No additional altered conditions are known to be present within this reach.

Swampy Meadows
This reach has a total of 40.08 acres of shoreline waterbody and 424.98 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There 3,537

square feet of impervious road surface and no impervious structural surface within this reach. No additional altered conditions are known to be present within this reach.

4.4.1.6 Public Access

The subwatershed has 19.15 miles of trails. The subwatershed is relatively inaccessible from state highways, although State Highway 141 heading north turns into a main forest service road, NF-23, that provides access to the subwatershed via other U.S. Forest Service roads.

4.4.1.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities include placing large woody debris within the White Salmon River to create pool habitat and increase sediment sorting and habitat complexity (NOAA Fisheries 2013b). Additional recommendations within the Upper White Salmon River basin include stormproofing and decommissioning forest roads where possible to reduce sedimentation and runoff (Washington Forest Protection Association 2005, Washington State Conservation Commission 2003).

4.4.2 Morrison Creek – White Salmon River (170701050802) – Map Sheet 4

4.4.2.1 Overview

The Morrison Creek – White Salmon River (170701050802) HUC is approximately 15,341 total acres, and includes 607.23 acres of shoreline jurisdictional area, including 11.31 miles of streams under shoreline jurisdiction and 18.77 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 46.0489/-121.5485, and its upstream location is 46.1042/-121.6081. The subwatershed is located within the Gifford Pinchot National Forest, southwest of Mount Adams. The subwatershed extends into Klickitat County to the east.

4.4.2.2 Reaches

White Salmon River (Reach #2): The longest reach of the White Salmon River within the subwatershed, it comprises approximately 3.4 miles of the upper mainstem to the confluence with Buck Creek. Its downstream location is 46.0754/-121.5668, and its upstream location is 46.1042/-121.6081. This reach is not a shoreline of statewide significance.

White Salmon River (Reach #3): This reach begins at the confluence of Buck Creek until the confluence of Morrison Creek. Its downstream location is 46.0604/-121.5504, and its upstream location is 46.0754 /-121.5668. This reach is not a shoreline of statewide significance.

White Salmon River (Reach #4): From the confluence of Morrison Creek, this reach continues until the confluence of the Green Canyon Creek, a non-shoreline jurisdiction stream. Its downstream location is 46.0489/-121.5485, and its upstream location is 46.0604/-121.5504. This reach is a shoreline of statewide significance.

Buck Creek: A short reach that flows northeast to southwest until its confluence with the White Salmon River, its downstream location is 46.0781/-121.5665, and its upstream location is 46.0754/-121.5668. This reach is not a shoreline of statewide significance.

Morrison Creek: The longest reach within the subwatershed begins on the southern flanks of Mount Adams and flows until its confluence with the White Salmon River. Its downstream location is 46.0604/-121.5504, and its upstream location is 46.1228/-121.5238. This reach is not a shoreline of statewide significance.

Unnamed Waterbody: This lake is located approximately 1.8 miles west of the confluence of Buck Creek and the White Salmon River. The center of this waterbody is at 46.0698/-121.6020. This reach is not a shoreline of statewide significance.

4.4.2.3 Physical Environment

The surficial geology (i.e., lithology) and soil types of the subwatershed are listed in Table 4-64. The subwatershed includes approximately 80.11 acres of landslide hazard zones.

Table 4-64. Surficial Geology and Soil Types - Morrison Creek – White Salmon River (170701050802)

Type	Percent
Surficial Geology	
Andesite Flows	30.0%
Alpine Glacial Drift (Pre-Fraser)	25.0%
Alpine Glacial Drift (Fraser-Age)	23.5%
Volcanoclastic Deposits or Rocks	11.7%
Basalt Flows	6.7%
Dacite Flows;	1.9%
Intrusive Rocks, Undivided, and Mass Wasting Deposits, Mostly Landslides	Less than 1% each
Soil Types	
Typic Vitricryands (Pum, M)	36.8%
Typic Vitricryands (Ashy/Med-SK)	19.2%
Typic Vitricryands (Pum)	14.0%
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	8.3%
Andic Cryumbrepts (Med/Lo-SK, M)	5.8%
Aquic Vitricryands (Ashy/Med-SK)	5.4%
Typic Udivitrands (Pum, M, FRG)	5.3%
Lithic Orthents, Andepts, Cryands, and Udands	4.8%
Aquolls, Fibrists, and Aquods, and Lithic Orthents	Less than 1% each

Vegetated cover within the subwatershed is composed of 73.76 percent forested woodland, 25.11 percent recently disturbed or modified land, 1.04 percent developed/other human use, and 0.09 percent shrubland and/or grassland.

4.4.2.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater emergent wetland, and habitat for elk. The PHS species within the subwatershed include northern spotted owl and northern goshawk. The non-PHS species within the subwatershed include Cascades frog, tailed frog, and Cope's giant salamander.

A total of 59.24 acres of NWI wetlands were identified within the subwatershed. These wetlands include 97.4 percent freshwater forested/shrub wetland and 2.6 percent freshwater emergent wetland.

4.4.2.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. It is entirely unzoned.

The subwatershed has approximately 64.01 miles of roads with a road density of 2.67 miles per square mile. The subwatershed has approximately 10,510,900 square feet of impervious road surfaces but no impervious surface for structures.

Known archaeological, cultural, or historical resources within the subwatershed include one historic property and 41 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

White Salmon River (Reach #2)

This reach has 3.42 total stream miles of jurisdictional streams and 163.3 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.15 miles of roads within the reach. It has approximately 23,529 square feet of impervious road surfaces, and no square footage of impervious surface for structures. No additional altered conditions are known to be present within this reach.

White Salmon River (Reach #3)

This reach has a total of 1.45 jurisdictional stream miles and 68.49 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or structures within this reach. No additional altered conditions are known to be present within this reach.

White Salmon River (Reach #4)

This reach has 0.91 total jurisdictional stream miles and 43.16 acres of shoreline jurisdictional area. The only existing land use within this reach is government

services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or surface within this reach. No additional altered conditions are known to be present within this reach.

Buck Creek
This reach has 0.21 jurisdictional stream miles and 10.66 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Morrison Creek
This reach has 5.32 total jurisdictional stream miles and 281.46 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.55 miles of roads within the reach. It has approximately 86,902 square feet of impervious road surfaces, but no impervious surface from structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody
This lake reach has a total of 18.77 acres of shoreline waterbody and 40.16 acres of jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.4.2.6 Public Access

The subwatershed has 11.70 miles of trails. While the subwatershed is fairly inaccessible from state highways, State Highway 141 heading north turns into a main USFS road, NF-23, that runs parallel to the White Salmon River and provides access to the subwatershed via other USFS roads.

4.4.2.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but recommended actions to protect and conserve natural ecological processes within the White Salmon River and Buck Creek include adopting and managing conservation agreements; applying best management practices (BMPs) and existing laws; providing public outreach to educate river users; and conducting habitat surveys to prioritize habitat needs.

Restoration opportunities within Buck Creek include restoring passage and connectivity to habitats that are blocked or impaired by artificial barriers; improving channel structure and complexity by placing large woody debris in streambeds and

stabilizing streambanks; and improving riparian conditions by eradicating invasive plant species and developing grazing strategies that promote riparian recovery (USFS 2016b, NOAA Fisheries 2013b).

4.4.3 Gotchen Creek – White Salmon River (170701050803) – Map Sheet 4

4.4.3.1 Overview

The Gotchen Creek – White Salmon River (170701050803) HUC is approximately 1,342 total acres within Skamania County with most of the subwatershed located in Klickitat County. Within Skamania County, the subwatershed includes 61.37 acres of shoreline jurisdictional area and 1.27 miles of shoreline jurisdiction streams. Using WGS 84, the subwatershed's downstream location is 46.0442/-121.5399, and its upstream location is 46.0489/-121.5485. The subwatershed is primarily in Klickitat County with a small portion located in Skamania County. The subwatershed portion within Skamania County is located within the Gifford Pinchot National Forest, south of Mount Adams.

4.4.3.2 Reaches

White Salmon River (Reach #5): This reach begins at the confluence of the non-jurisdictional Green Canyon Creek and terminates at the border of the Gifford Pinchot National Forest. Its downstream location is 46.0442/-121.5399, and its upstream location is 46.0489/-121.5485. This reach is a shoreline of statewide significance.

Hole in the Ground Creek: This short reach is located south of Morrison Creek. The creek's headwaters are located in Klickitat County and flows into Skamania County for a short distance and then flow back into Klickitat County. Its downstream location is 46.0681/-121.5239, and its upstream location is 46.0776/-121.5244. This reach is not a shoreline of statewide significance.

4.4.3.3 Physical Environment

The surficial geology (i.e., lithology) and soil types of this watershed are listed in Table 4-65.

Table 4-65. Surficial Geology and Soil Types - Gotchen Creek – White Salmon River (170701050803)

Type	Percent
Surficial Geology	
Andesite Flows	52.8%
Basalt Flows	35.5%
Alpine Glacial Drift (Fraser-Age)	11.6%
Dacite Flows	Less than 1%
Soil Types	
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	74.4%
Typic Udivitrands (Pum, M, FRG)	14.0%
Typic Vitricryands (Pum, M)	11.1%

Type	Percent
Typic Vitricryands (Pum); and Typic Vitricryands (Ashy/Med-SK).	Less than 1% each

Vegetated cover within the subwatershed is composed of 95.2 percent forested woodland, 4.4 percent recently disturbed or modified land, and less than one percent of developed/other human use; and shrubland and/or grassland.

4.4.3.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland and habitat for elk. The PHS species within the subwatershed include the northern spotted owl. A total of 1.85 acres of freshwater forested/shrub NWI wetlands were identified within the subwatershed.

4.4.3.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. It is entirely unzoned.

The subwatershed has approximately 10.44 miles of roads and a road density of 4.98 miles per square mile. The subwatershed has approximately 1,817,312 square feet of impervious road surfaces and no impervious surface for structures.

Known archaeological, cultural, or historical resources within the subwatershed include three archaeological sites.

The subwatershed has two wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

White Salmon River (Reach #5)

This reach has 0.58 total jurisdictional stream miles and 27.46 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or structures within this reach. No additional altered conditions are known to be present within this reach.

Hole in the Ground Creek

This reach has 0.69 total stream miles and 33.9 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.26 miles of roads within the reach. It has approximately 40,485 square feet of impervious road surfaces, and no additional square feet of impervious surface for structures. No additional altered conditions are known to be present within this reach.

4.4.3.6 Public Access

The subwatershed has 2.94 miles of trails. It is fairly inaccessible from state highways, but a primary USFS road, NF-23, runs parallel to the White Salmon River and provides access to the subwatershed via other USFS roads.

4.4.3.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but recommended actions to protect and conserve natural ecological processes within the White Salmon River include adopting and managing conservation agreements; applying BMPs and existing laws; providing public outreach to educate river users; and conducting habitat surveys to prioritize habitat needs. Restoration opportunities within this reach of the White Salmon River include improving channel structure and complexity by placing large woody debris in streambeds and stabilizing streambanks; and improving riparian conditions by eradicating invasive plant species and developing grazing strategies that promote riparian recovery (USFS 2016b, NOAA Fisheries 2013b).

4.4.4 Upper Trout Lake Creek (170701050804) – Map Sheets 2 and 4

4.4.4.1 Overview

The Upper Trout Lake Creek (170701050804) HUC is approximately 28,283 total acres in area with 1326.50 acres of shoreline jurisdictional area, including 14 miles of shoreline jurisdictional streams and 255.83 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 46.0635/-121.6584. This subwatershed is located just east of the Cascade Range crest in the Gifford Pinchot National Forest.

4.4.4.2 Reaches

Trout Lake Creek (Reach #1): This is the uppermost reach of Trout Lake Creek and extends to the confluence of Mosquito Creek. Its downstream location is 46.0977/-121.6964, and its upstream location 46.1279/-121.6859. This reach is not a shoreline of statewide significance.

Trout Lake Creek (Reach #2): This reach extends from of Mosquito Creek to the confluence of Cultus Creek. Its downstream location is 46.0789/-121.6823, and its upstream location is 46.0977/-121.6964. This reach is not a shoreline of statewide significance.

Trout Lake Creek (Reach #3): This reach extends from the confluence of Cultus Creek to the confluence of Little Goose Creek. Its downstream location is 46.0635/-121.6584, and its upstream location is 46.0789/-121.6823. This reach is not a shoreline of statewide significance.

Cultus Creek (Reach #1): This is the upper reach of Cultus Creek and flows southwest to northeast. Its downstream location is 46.0754/-121.6955, and its

upstream location is 46.0630/-121.7282. This reach is not a shoreline of statewide significance.

Cultus Creek (Reach #2): This is the lower reach of Cultus Creek and extends to its confluence with Trout Lake Creek. Its downstream location is 46.0789/-121.6823, and its upstream location is 46.0754/-121.6955. This reach is not a shoreline of statewide significance.

Little Goose Creek: This reach extends from just downstream of the confluence of Smoky Creek to its confluence at Trout Lake Creek. Its downstream location is 46.0635/-121.6584, and its upstream location is 46.0584/-121.6710. This reach is not a shoreline of statewide significance.

Meadow Creek: This reach flows southeast until its confluence at Cultus Creek. Its downstream location is 46.0754/-121.6955, and its upstream location is 46.0832/ 121.7204. This reach is not a shoreline of statewide significance.

Mosquito Creek: This reach begins north of Tire Junction and flows southeast until its confluence at Trout Lake Creek. Its downstream location is 46.0977/-121.6964, and its upstream location is 46.1067/-121.7238. This reach is not a shoreline of statewide significance.

Big Mosquito Lake: This waterbody is located just north of Saddle Campground and east of Tillicum Campground. The center of this waterbody is at 46.1279/-121.7592. This reach is not a shoreline of statewide significance.

Grand Meadows: This waterbody is located southwest of Swampy Meadows and east of Steamboat Mountain. The center of this waterbody is at 46.1501/-121.6561. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #1: This waterbody is located east of Mosquito Creek and north of Tire Junction. The center of this waterbody is at 46.1098/-121.7274. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #2: This waterbody is located north of Meadow Creek and south of Tire Junction. The center of this waterbody is at 46.0837/-121.7253. This reach is not a shoreline of statewide significance.

4.4.4.3 Physical Environment

The surficial geology (i.e., lithology) and soil types of the subwatershed are listed in Table 4-66. The subwatershed has approximately 375.77 acres of landslide hazard zones.

Table 4-66. Surficial Geology and Soil Types - Upper Trout Lake Creek (170701050804)

Type	Percent
Surficial Geology	
Basalt Flows	26.3%
Alpine Glacial Till (Fraser-Age)	20.87%
Alpine Glacial Drift (Fraser-Age)	13.8%
Volcaniclastic Deposits or Rocks	11.65%
Basaltic Andesite Flows	11.42%
Alpine Glacial Till (Pre-Fraser)	4.31%
Tuffs and Tuff Breccias	3.35%
Basalt Flows	2.77%
Andesite Flows	2.0%
Continental Sedimentary Deposits or Rocks, Conglomerate	1.81%
Mass-Wasting Deposits, Mostly Landslides	1.33%
Water and Alluvium	Less than 1% each
Soil Types	
Typic Vitricryands (Ashy/Med-SK)	20.6%
Aquic Vitricryands (Ashy/Med-SK)	20.2%
Typic Vitricryands (Pum)	19.1%
Typic vitricryands (Pum, M)	16.8%
Typic udivitrands (Pum, M, FRG)	7.1%
Andic haplumbrepts (Med/Lo-SK, M, FRG)	4.0%
Lithic Orthents, Andepts, Cryands, and Udands	3.8%
Andic Cryumbrepts (Med/Lo-SK, M)	3.5%
Aquolls, Fibrists, And Aquods	3.3%
Vitric Haplocryands (Cind/Med)	1.2%
Undefined Soils	Less than 1%

Vegetated cover within the subwatershed is composed of 74.87 percent forested woodland, 21.62 percent recently disturbed or modified land, 2.19 percent developed/other human use, 1.07 percent shrubland and/or grassland, 0.17 percent open water, and 0.09 percent nonvascular or sparse vascular rock vegetation.

4.4.4.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater emergent wetland, freshwater pond, lake, "other" type of wetland, caves or cave-rich areas, and elk habitat. The PHS species within the subwatershed include northern spotted owl, northern goshawk, western toad, Townsend's big-eared bat, wolverine, and harlequin duck. The non-PHS species monitored within the subwatershed include tailed frog and Cascades frog.

A total of 947.3 acres of NWI wetlands were identified within the subwatershed. These wetlands include 71 percent freshwater forested/shrub wetland, 18.2 percent freshwater emergent wetland, 7.8 percent freshwater pond, 3 percent lake, and less than one percent of "other" type of wetland.

4.4.4.5 Land Use and Altered Conditions

The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

The subwatershed has approximately 113.27 miles of roads and a road density of 2.56 miles per square mile. The subwatershed has approximately 18,313,632 square feet of impervious road surfaces but no impervious surface for structures.

Known archaeological, cultural, or historical resources within the subwatershed include five historic properties and 189 archeological sites.

The subwatershed has one wellhead protection area associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed

Trout Lake Creek (Reach #1)
This reach has 2.48 total jurisdictional stream miles and 120.2 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

The reach has approximately 265 square feet of impervious road surfaces, and no additional square feet of impervious surface for structures. No additional altered conditions are known to be present within this reach.

Trout Lake Creek (Reach #2)
This reach has 1.67 total jurisdictional stream miles and 79.04 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or structures within this reach. No additional altered conditions are known to be present within this reach.

Trout Lake Creek (Reach #3)
This reach has 1.96 total jurisdictional stream miles and 92.91 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or structures within this reach. No additional altered conditions are known to be present within this reach.

Cultus Creek (Reach #1)
This reach has 2.47 total jurisdictional stream miles and 130.21 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.10 miles of roads within the reach. It has approximately 19,660 square feet of impervious road surfaces, and no additional impervious surface

for structures. No additional altered conditions are known to be present within this reach.

Cultus Creek (Reach #2)
This reach has 0.73 total jurisdictional stream miles and 33.94 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or structures within this reach. No additional altered conditions are known to be present within this reach.

Little Goose Creek
This reach has 0.77 total jurisdictional stream miles and 37.68 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or structures within this reach. No additional altered conditions are known to be present within this reach.

Meadow Creek
This reach has 1.84 total jurisdictional stream miles and 84.97 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.31 miles of roads within the reach. It has approximately 51,109 square feet of impervious road surfaces, and no additional square feet of impervious surface for structures. No additional altered conditions are known to be present within this reach.

Mosquito Creek
This reach has 2.08 total jurisdictional stream miles and 97.39 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.44 miles of roads within the reach. It has approximately 73,535 square feet of impervious road surfaces, and additional no square feet of impervious surface for structures. No additional altered conditions are known to be present within this reach.

Big Mosquito Lake
This reach has a total of 26.63 acres of shoreline waterbody and 132.17 acres of jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.10 miles of roads within the reach. It has approximately 19,708 square feet of impervious road surfaces, and no additional square feet of

impervious surface for structures. No additional altered conditions are known to be present within this reach.

Grand Meadows
This reach has a total of 50.53 acres of shoreline waterbody and 91.58 acres of jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.08 miles of roads within the reach. It has approximately 13,836 square feet of impervious road surfaces, and no additional square feet of impervious surface for structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #1
This reach has a total of 50.14 acres of shoreline waterbody and 89.03 acres of jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.04 miles of roads within the reach. It has approximately 8,424 square feet of impervious road surfaces, and no additional square feet of impervious surface for structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #2
This reach has a total of 128.54 acres of shoreline waterbody and 337.37 acres of jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned. There are no impervious roads or structures within this reach. No additional altered conditions are known to be present within this reach.

4.4.4.6 Public access
The subwatershed has 52.96 miles of trails. The subwatershed is relatively inaccessible from state highways however there are a number of forest service roads throughout the subwatershed that are accessible from local roads including Twin Buttes Road and forest service road NF-23.

4.4.4.7 Restoration opportunities
Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities include planting riparian areas, actions to reduce effects of livestock on riparian areas, upgrading or removing roads, and undertaking projects to improve channel morphology such as placing large woody debris or streambank stabilization measures (USFS 2016b, Northwest Power and Conservation Council 2004).

4.4.5 Lower Trout Lake Creek (170701050805) – Map Sheet 4

4.4.5.1 Overview

The Lower Trout Lake Creek (170701050805) HUC in Skamania County is approximately 19,587 total acres in size and includes 330.83 acres of shoreline jurisdictional area, including 5.59 miles of shoreline jurisdiction streams and 21.77 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 46.0439/-121.5970, and its upstream location is 46.0635/-121.6584. A portion of this subwatershed is located in the Gifford Pinchot National Forest and in Klickitat County to the east. This watershed is located northwest of Trout Lake.

4.4.5.2 Reaches

Trout Lake Creek (Reach #4): This reach begins at the confluence of Little Goose Creek and continues until the boundary of the Gifford Pinchot National Forest, adjacent to Trout Lake Creek Campground. Its downstream location is 46.0439/-121.5970, and its upstream location is 46.0635/-121.6584. Portions of this reach include a shoreline of statewide significance.

Dry Creek: This reach is located north of Carson Guler Road and ends at the boundary of the Gifford Pinchot National Forest and Skamania County. Its downstream location is 45.9686/-121.6124, and its upstream location is 45.9708/-121.6368. This reach is not a shoreline of statewide significance.

Unnamed Waterbody: This waterbody is located east of Trout Lake Creek Campground off NF-8821. The center of this waterbody is at 46.0360/-121.6338. This reach is not a shoreline of statewide significance.

4.4.5.3 Physical Environment

The surficial geology (i.e., lithology) and the soil types of the subwatershed are listed in Table 4-67. The subwatershed has approximately 49.28 acres of landslide hazard zones.

Table 4-67. Surficial Geology and Soil Types - Lower Trout Lake Creek (170701050805)

Type	Percent
Surficial Geology	
Basalt Flows	55.2%
Volcanoclastic Deposits or Rocks	32.6%
Alpine Glacial Till (Fraser-Age)	5.3%
Alluvium	3.4%
Alpine Glacial Drift (Pre-Fraser)	1.6%
Alpine Glacial Till (Pre-Fraser)	1.23%
Intrusive Rocks, Undivided; Mass-Wasting Deposits, Mostly Landslides; and Dacite Flows	Less than 1% each
Soil Types	
Typic Vitricryands (Ashy/Med-SK)	21.5%
Typic vitricryands (Pum, M)	19.2%

Type	Percent
Andic Cryumbrepts (Med/Lo-SK, M)	14.0%
Andic Haplumbrepts (Med/C, M, FRG)	12.5%
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	10.7%
Aquic Vitricryands (Ashy/Med-SK)	6.9%
Typic Udivitrands (Pum, M, FRG)	6.5%
Typic Hapludands (Med, M, MES)	4.1%
Lithic Orthents, Andepts, Cryands, and Udands	2.6%
Aquolls, Fibrists, and Aquods	1.1%
Typic Vitricryands (pum); Lithic Orthents; And Andic Haplumbrepts (Med/Lo, M, FRG)	Less than 1% each

Vegetated cover within the subwatershed is composed of 68.4 percent forested woodland, 30.4 percent recently disturbed or modified land, and less than one percent of the following classes: developed/other human use, shrubland and/or grassland, and open water.

4.4.5.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater emergent wetland, riverine wetland, freshwater pond, caves or cave-rich areas, herbaceous bald, and elk habitat. The PHS species within the subwatershed include northern spotted owl, northern goshawk, Townsend's big-eared bat, big brown bat, harlequin duck, California myotis, western long-eared bat, fringed myotis, long-legged myotis, and Oregon spotted frog. The non-PHS species monitored within the subwatershed include the Cascades frog.

A total of 266 acres of NWI wetlands were identified within the subwatershed. These wetlands include 79.6 percent freshwater forested/shrub wetland, 12.5 percent freshwater emergent wetland, 6.7 percent riverine wetland, and 1.1 percent freshwater pond.

4.4.5.5 Land Use and Altered Conditions

The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

The subwatershed has approximately 95.47 miles of roads and a road density of 3.12 miles per square mile. The subwatershed has approximately 15,311,158 square feet of impervious road surfaces and no additional impervious surface for structures.

Known archaeological, cultural, or historical resources within the subwatershed include one historic property and 59 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within the subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with temperature

and pH within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Trout Lake Creek (Reach #4)
This reach has a total of 4.26 jurisdictional stream miles and 222.56 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.91 miles of roads within the reach. It has approximately 141,149 square feet of impervious road surfaces, and no additional impervious surface for structures. This reach has two 303(d) listings associated with temperature and pH. No additional altered conditions are known to be present within this reach.

Dry Creek
This reach has 1.32 total jurisdictional stream miles and 43.24 acres of shoreline jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.30 miles of roads within the reach. It has approximately 46,746 square feet of impervious road surfaces, and no additional impervious surface for structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody
This reach has a total of 21.77 acres of shoreline waterbody and 43.24 acres of jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.06 miles of roads within the reach. It has approximately 9,750 square feet of impervious road surfaces, and no additional impervious surface for structures. No additional altered conditions are known to be present within this reach.

4.4.5.6 Public Access
The subwatershed has 16.3 miles of trails. It is fairly inaccessible from state highways, although a number of USFS roads throughout the subwatershed are accessible from local roads, including Trout Lake Creek Road, Bear Springs Road, and Carson Guler Road.

4.4.5.7 Restoration Opportunities
Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature and pH within the subwatershed. Restoration opportunities include planting riparian areas, taking actions to reduce the effects of livestock on riparian areas, upgrading or removing roads, and undertaking projects to improve the channel morphology, such as placing

large woody debris or streambank stabilization measures (USFS 2016b, Northwest Power and Conservation Council 2004).

4.4.6 Cave Creek (170701050806) – Map Sheet 4

4.4.6.1 Overview

The Cave Creek hydrologic unit (170701050806) is approximately 10,076 total acres within Skamania County and does not include any waterbodies that meet shoreline jurisdiction criteria. The subwatershed extends into Klickitat County to the east. The portion of the subwatershed within Skamania County is located within the Gifford Pinchot National Forest, approximately equidistant from Mount Adams and the Columbia River.

4.4.6.2 Reaches

This subwatershed has no shoreline reaches in Skamania County.

4.4.6.3 Physical Environment

The surficial geology (i.e., lithology) and soil types found in this subwatershed are listed in Table 4-68.

Table 4-68. Surficial Geology and Soil Types - Cave Creek (170701050806)

Type	Percent
Surficial Geology	
Basalt Flows	48.1%
Alpine Glacial Till	23.1%
Volcaniclastic Deposits or Rocks	14.5%
Intrusive Rhyolite	10.38%
Alluvium	3.0%
Diorite and Water	Less than 1% each
Soil Types	
Typic Udivitrands (Pum, M, FRG)	44.2%
Andic Haplumbrepts (Med/C, M, FRG)	20.5%
Typic Vitricryands (Pum, M)	15.7%
Andic Cryumbrepts (Med/Lo-SK, M)	10.3%
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	4.8%
Lithic Orthents, Andepts, Cryands, and Udands	1.2%
Andic Haplumbrepts (Med/Lo, M, FRG)	1.2%
Typic Vitricryands (PUM); and Aquolls, Fibrists, and Aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 52.71 percent recently disturbed or modified land, 45.8 percent forested woodland, 1.19 percent developed/other human use, and less than one percent open water and shrubland and/or grassland.

4.4.6.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater pond, freshwater emergent wetland, cave or

cave-rich areas, and elk habitat. The PHS species within the subwatershed include northern spotted owl, Townsend's big-eared bat, and western toad. The non-PHS species monitored within the subwatershed include the Cascades frog.

A total of 93.8 acres of NWI wetlands were identified within the subwatershed. These wetlands include 82.8 percent freshwater forested/shrub wetland, 15.5 percent freshwater pond, and 1.6 percent freshwater emergent wetland.

4.4.6.5 Land Use and Altered Conditions

The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

The subwatershed has approximately 69.02 miles of roads and a road density of 4.38 miles per square mile. The subwatershed has approximately 11,351,435 square feet of impervious road surfaces, and no additional impervious surface for structures.

Known archaeological, cultural, or historical resources within the subwatershed include one historic property and 37 archeological sites. The subwatershed also has one wellhead protection area associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed. No additional altered conditions are known to be present within this reach.

4.4.6.6 Public Access

The subwatershed has 6.69 miles of trails, but is fairly inaccessible from state highways. However, a number of USFS roads throughout the subwatershed are accessible from local roads, including Twin Buttes Road and Bear Springs Road.

4.4.6.7 Restoration Opportunities

There are no reaches within this subwatershed and restoration opportunities are therefore limited. Consistently applying BMPs and existing laws to protect and conserve natural ecological processes will help improve the surrounding habitat and reaches.

4.4.7 Buck Creek (170701050810) – Map Sheet 6a

4.4.7.1 Overview

The Buck Creek HUC (170701050810) is approximately 369 total acres in Skamania County, with 3.97 acres of shoreline jurisdictional area and 0.21 miles of shoreline jurisdiction waterbodies. Using WGS 84, the subwatershed's downstream location is 45.7810/-121.5154. Most of this subwatershed is located in Klickitat County to the east.

4.4.7.2 Reaches

Buck Creek: This reach includes a short portion of Buck Creek to the Skamania County border. Its downstream location is 45.7810/-121.5154, and its upstream location is 45.7821/-121.5168. This reach is not a shoreline of statewide significance.

4.4.7.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed is listed in Table 4-69.

Table 4-69. Surficial Geology and Soil Types - Buck Creek HUC (170701050810)

Type	Percent
Surficial Geology	
Basalt Flows	85.1%
Mass-Wasting Deposits	14.4%
Continental Sedimentary Deposits or Rocks	Less than 1%
Soil Types	
Timberhead Gravelly Loam (5 to 30 percent slopes);	90.8%
Andic Cryumbrepts (Med/Lo-SK, M),	5.6%
Hood Loam (15 to 30 percent slopes); and	1.8%
Husum Gravelly Loam (0 to 5 percent slopes).	1.7%

The subwatershed has approximately 53.23 acres of landslide hazard zones and also has a total of 2.12 acres of 100-year FEMA floodplain.

Vegetated cover within the subwatershed is composed of 97.65 percent forested woodland, 1.74 percent recently disturbed or modified land, and less than one percent of both of the following types: developed/other human use and shrubland and/or grassland.

4.4.7.4 Biological Resources

The PHS priority habitat types within the subwatershed include elk habitat. There are no PHS species or non-PHS species listed within this subwatershed. There are no NWI wetlands within the subwatershed.

4.4.7.5 Land Use and Altered Conditions

The existing land use within the subwatershed includes 96.5 percent government services, 1.9 percent residence or accommodation functions, and 1.6 percent construction-related business. Approximately 3.5 percent of the subwatershed is privately owned and 96.5 percent is publicly owned. In terms of zoning, the watershed is 96.5 percent forest and 3.5 percent residential – lower density.

The subwatershed has approximately 3.33 miles of roads and a road density of 5.78 miles per square mile. The subwatershed has approximately 7,751 square feet of impervious surfaces and 556,474 square feet of impervious road surfaces; these total 564,225 square feet of impervious area.

The subwatershed has three wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

Buck Creek

This reach has 0.11 total jurisdictional stream miles and 3.97 acres of shoreline jurisdictional area. The existing land uses within this reach are 96.8 percent construction-related business and 3.2 percent residence or accommodation functions. The reach is 100 percent privately owned. In terms of zoning, all of the reach is zoned for residential – lower density.

There are approximately 0.20 miles of roads within the reach. It has approximately 2,701 square feet of impervious surface and 33,005 square feet of impervious road surfaces, which total 35,707 square feet of impervious area. No additional altered conditions are known to be present within this reach.

4.4.7.6 Public Access

The subwatershed is fairly accessible from State Highway 141 to Northwestern Lake Road, which runs parallel to Buck Creek.

4.4.7.7 Restoration Opportunities

Ecological functions within this subwatershed are generally in good condition, but recommended actions to protect and conserve natural ecological processes within the Buck Creek subwatershed include adopting and managing conservation agreements, applying BMPs and existing laws, and providing public outreach to educate river users. Restoration opportunities within the subwatershed include improving channel structure and complexity by placing large woody debris in streambeds and stabilizing streambanks, and improving riparian conditions by eradicating invasive plant species and developing grazing strategies that promote riparian recovery (USFS 2016b, NOAA Fisheries 2013b).

4.4.8 North Weston Lake – Salmon River (Northwestern Lake) (170701050811) – Map Sheet 6d

4.4.8.1 Overview

The Lower White Salmon River hydrologic unit (170701050811) is approximately 6,277 total acres in an area with 152.75 acres of shoreline jurisdictional area and 5.11 miles of shoreline jurisdiction waterbodies. This HUC was previously named Northwestern Lake – White Salmon River, until the removal of the Condit Dam, located in Klickitat County, drained the manmade Northwestern Lake and is now simply referred to as the Lower White Salmon River. Using the WGS 84, the subwatershed's downstream location is 45.7283/-121.5218. The subwatershed includes the lower reaches of the White Salmon River until its confluence with the Columbia River in Underwood, Washington.

4.4.8.2 Reaches

White Salmon River Reach #6: From just upstream of the confluence of Buck Creek to its confluence at the Columbia River. Its downstream location is 45.7283/-121.5218, and its upstream location is 45.7821/-121.5145. This reach is a shoreline of statewide significance.

4.4.8.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soils types in the subwatershed is listed in Table 4-70. The subwatershed has approximately 605.44 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

Table 4-70. Surficial Geology and Soil Types - Lower White Salmon River (170701050811)

Type	Percent
Surficial Geology	
Basalt Flows	86.3%
Mass-Wasting Deposits, Mostly Landslides	9.6%
Continental Sedimentary Deposits or Rocks	1.9%
Outburst Flood Deposits, Sand and Silt	1.1%
Soils	
Chemawa loam (15 to 30 % slopes)	16.0%
Chemawa loam (8 to 15 % slopes)	12.3%
McElroy gravelly loam (30 to 65 % slopes)	12%
Undusk gravelly loam (30 to 65 % slopes)	6.8%
McElroy very stony loam (5 to 15 % slopes)	6.3%
McElroy gravelly loam (15 to 30 % slopes)	5.9%
Chemawa loam (30 to 50 % slopes)	4.4%
Undusk gravelly loam (5 to 30 % slopes)	4.2%
Timberhead gravelly loam (5 to 30 % slopes)	4.1%
Underwood loam (15 to 30 % slopes)	4.0%
Underwood loam (2 to 15 % slopes)	3.8%
Hood loam (8 to 15 % slopes)	3.5%
McElroy gravelly loam (5 to 15 % slopes)	3.2%
Xerorthents-Rock outcrop complex (50 to 90 %slopes)	2.8%
Underwood loam (30 to 50 % slopes)	2.5%
Timberhead gravelly loam (30 to 65 % slopes)	2.4%
Hood loam (15 to 30 %slopes)	1.9%
Chemawa loam (2 to 8 % slopes)	1.9%
Water	1.3%
Hood loam (3 to 8 % slopes); rock outcrop-Rubbleland complex; and Husum gravelly loam (0 to 5 % slopes).	Less than 1% each

Vegetated cover within the subwatershed is composed of 83.45 percent forested woodland, 7.45 percent recently disturbed or modified land, 5.48 percent agriculture,1.18 percent nonvascular or sparse vascular rock vegetation, and less than one percent of the following types: developed/other human use, open water,

semi-desert, percent shrubland and/or grassland. The subwatershed has a total of 96.57 acres of 100-year FEMA floodplain.

4.4.8.4 Biological Resources

The PHS priority habitat types within the subwatershed include lake, freshwater pond, freshwater forested/shrub wetland, talus slopes, cliffs/bluffs, and habitat for waterfowl, elk, and mule and black-tailed deer. The PHS species within the subwatershed include northern spotted owl, California mountain kingsnake, and western gray squirrel. The non-PHS species monitored within the subwatershed include: osprey and ringneck snake.

Approximately 1.59 stream miles of White Salmon River bull trout/Dolly Varden, and 3.27 stream miles of the following fish are found within the watershed: White Salmon River bright fall Chinook, White Salmon River summer steelhead, White Salmon River tule fall Chinook, and White Salmon River winter steelhead. Previously, the greatest barrier to fish passage was the Condit Dam, which was intentionally breached in 2011 to restore fish passage. Immediately after dam removal, habitat quality was affected due to the increase of fine sediment transported out the reservoir area downstream to the Columbia River. The return of downstream wood transport is anticipated to eventually help create wood deposits that will create pools, fish-holding habitat, and sort sediment.

A total of 75.8 acres of NWI wetlands were identified within the subwatershed. These wetlands include 93.2 percent lake, 4.5 percent freshwater pond, 2 percent freshwater forested/shrub wetland, and less than one percent riverine.

4.4.8.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 39.4 percent agriculture, forestry, fishing and hunting uses; 27.6 percent mining and extraction establishments; 23.9 percent residence or accommodation functions; 6 percent transportation, communication, information, and utilities; 1.7 percent government services, 1.2 percent undefined; and less than one percent construction-related business. Approximately 97.1 percent of the subwatershed is privately owned and 2.9 percent is publicly owned. In terms of zoning, the watershed is 44.1 percent unzoned, 27.3 percent forest, 11 percent agriculture, 9.5 percent residential – lower density, 4.6 percent residential – higher density, 2.8 percent open space/conservancy, and less than one percent of each of the following uses: water, government/service, and commercial.

The subwatershed has approximately 81.19 miles of roads and a road density of 8.28 miles per square mile. It has approximately 795,967 square feet of impervious structural surfaces and 12,992,780 square feet of impervious road surfaces for a total of 13,788,747 square feet of impervious surfaces. The subwatershed has one bridge

on SR 14 over the White Salmon River, data for bridges on County or other roads were not available.

Known archaeological, cultural, or historical resources within the subwatershed include 26 historic properties, one historic register point, 46 archaeological sites, four cemeteries, and two historic districts.

The subwatershed has eight wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with polychlorinated biphenyls (PCB) within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

White Salmon River Reach #6

This reach has 5.11 total stream miles and 152.75 acres of shoreline jurisdictional area. The existing land used within this reach are 79.4 percent transportation, communication, information, and utilities; 10.4 percent undefined; 5.2 percent construction-related business; 3.3 percent government services; and less than 1 percent of each of the following uses: mining and extraction establishments; and agriculture, forestry, hunting and fishing uses. Approximately 86.2 percent of the reach is privately owned and 13.8 percent is publicly owned. In terms of zoning, the reach is 38.7 percent open space/conservancy, 31.4 percent residential – lower density, 21.6 percent water, 2.8 percent government/service, and less than one percent unzoned.

There are approximately 0.86 miles of roads within the reach's shoreline jurisdiction. It has approximately 11,668 square feet of impervious structural surfaces and 168,213 square feet of impervious road surfaces for a total of 179,882 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

4.4.8.6 Public Access

The subwatershed is relatively accessible from SR 14, SR 141, and Cook-Underwood Road. SR 141 runs parallel to the White Salmon River and a number of local roads and forest service roads provide access within the subwatershed.

4.4.8.7 Restoration Opportunities

Ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with polychlorinated biphenyls (PCB) within the subwatershed. To minimize the increased sedimentation as a result of the Condit Dam removal, the placement of large woody debris can increase pool habitat, sediment sorting and habitat complexity along the White Salmon River (USFS 2016b, Northwest Power and Conservation Council 2004).

4.4.9 Dry Creek-Lost Creek (170701050901) – Map Sheet 4

4.4.9.1 Overview

The Dry Creek-Lost Creek HUC (170701050901) is approximately 11,639.5 total acres with 394.06 acres of shoreline jurisdictional area, including 7.4 miles of shoreline jurisdiction waterbodies and 15.13 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 45.9148/-121.7162. The subwatershed is located on the east side of the east/west boundary line of the Cascade Range in the central-east portion of Skamania County. The subwatershed is located entirely in the Gifford Pinchot National Forest.

4.4.9.2 Reaches

Lost Creek (Reach #1): The upper reach of Lost Creek flows in the north-south direction within the Gifford Pinchot National Forest. Its downstream location is 45.9447/-121.7151, and its upstream location is 45.9696/-121.7216. This reach is not a shoreline of statewide significance.

Lost Creek (Reach #2): From the confluence of Dry Creek, the lower reach of Lost Creek flows north to south until its confluence at Lava Creek. Its downstream location is 45.9148/-121.7162, and its upstream location is 45.9447/-121.7151. This reach is not a shoreline of statewide significance.

Dry Creek: Dry Creek flows northwest to southeast until its confluence at Lost Creek. Its downstream location is 45.9447/-121.7151, and its upstream location is 45.9664/-121.7417. This reach is not a shoreline of statewide significance.

Forlorn Lakes: One of the Forlorn Lakes is within the County's shoreline jurisdiction and is located east of Gifford Peak and Red Mountain. The center of this waterbody is at 45.9632/-121.7584. This lake reach is not a shoreline of statewide significance.

4.4.9.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed in listed in Table 4-71.

Table 4-71. Surficial Geology and Soil Types - Dry Creek-Lost Creek (170701050901)

Type	Percent
Surficial Geology	
Basalt Flows	48.4%
Alpine Glacial Till	40.6%
Andesite Flows	7.6%
Alpine Glacial Outwash	2.6%
Alluvium, Water, and Diorite	Less than 1% each
Soil Types	
Typic Vitricryands	58.5%
Typic Udivitrands (PUM, M, FRG)	22.8%
Andic Cryumbrepts (Med/Lo-SK, M)	13.6%

Type	Percent
Orthents, Andepts, and Cryands	2.2%
Lithic Orthents, Andepts, Cryands, Udands	1.1%
Aquolls, Fibrists, And Aquods.	Less than 1% each

Vegetated cover within the subwatershed is composed of 65.6 percent forested woodland, 32.7 percent recently disturbed or modified land, 1.2 percent developed/other human use, and less than one percent each of open water and shrubland and/or grassland. See Map 5 for pCMZs within this subwatershed.

4.4.9.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater pond, freshwater emergent wetland, riverine wetland, lake, freshwater forested/shrub wetland, caves or cave-rich areas, and elk habitat.

The PHS species within the subwatershed include northern spotted owl, northern goshawk, gray wolf, and western toad. The non-PHS species within the subwatershed include the Cascades frog.

In addition, a total of 193.2 acres of NWI wetlands were identified within the subwatershed. These wetlands include 47.2 percent freshwater pond, 30.8 percent freshwater emergent wetland, 12.4 percent riverine wetland, 7.6 percent lake, and 1.8 percent freshwater forested/shrub wetland.

4.4.9.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, the subwatershed is entirely unzoned.

The subwatershed has approximately 56.19 miles of roads and a road density of 3.09 miles per square mile. The subwatershed has 9,357,263 square feet of impervious road surfaces, and no additional impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include two historic properties and 41 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present within the subwatershed. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Lost Creek (Reach #1)

This shoreline waterbody is a total of 2.25 total stream miles and has 108.84 acres of jurisdictional area. The existing land use within Lost Creek (Reach #1) jurisdiction is

100 percent government services. The reach is 100 percent publicly owned and entirely unzoned.

There are approximately 0.21 miles of roads within the reach. It has approximately 37,505 square feet of impervious road surfaces and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Lost Creek (Reach #2)
This shoreline waterbody is 2.78 total stream miles and has 131.38 acres of jurisdictional area. The only existing land use within Lost Creek (Reach #2) jurisdiction is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.28 miles of roads within the reach. It has approximately 51,805 square feet of impervious road surfaces and no additional impervious area from structures. This reach has a State 303d listing for temperature. No additional altered conditions are known to be present within this reach.

Dry Creek
This shoreline waterbody is 2.38 total stream miles and has 113.94 acres of jurisdictional area. The only existing land use within Dry Creek jurisdiction is government services, and all of the reach is publicly owned. It is entirely unzoned.

There are approximately 0.38 miles of roads within the reach. It has approximately 67,807 square feet of impervious road surfaces and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

Forlorn Lakes
This shoreline waterbody is a total of 15.13 acres and has 39.9 acres of jurisdictional area. The only existing land use within Forlorn Lakes is government services, and all of the reach is publicly owned. It is entirely unzoned.

The reach has approximately 0.17 miles of roads and a road density of 2.68 miles per square mile. It has approximately 26,787 square feet of impervious road surfaces and no additional impervious area from structures. No additional altered conditions are known to be present within this reach.

4.4.9.6 Public Access

The subwatershed has 5.83 miles of trails. The subwatershed is fairly accessible from South Prairie Road and Forlorn Lakes Road and adjoining USFS roads.

4.4.9.7 Restoration Opportunities

Lost Creek has been affected primarily by forestry activities. Additionally, ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed. Restoration opportunities include protecting the following components to prevent further degradation: floodplain function and channel migration processes; access to habitats; instream flows through management of water withdrawals; water quality; and the natural stream flow regime. Restoring the natural riparian plant community and eradicating invasive plant species from riparian areas could also help restore riparian conditions within Lost Creek. The addition of stable woody debris or structural modifications to channel morphology in Lost Creek could restore channel structure and stability and enhance pool formation and sediment sorting (Lower Columbia Fish Recovery Board 2004).

4.4.10 Lava Creek (17070150902) – Map Sheet 4, 6, and 6a

4.4.10.1 Overview

Lava Creek (17070150902) is approximately 34,527 total acres in area with 1,101 acres of shoreline jurisdictional area, including 16.58 miles of shoreline jurisdiction streams and 119.57 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 45.7924/-121.6720, and its upstream location is 45.9390/-121.7580. The Lava Creek subwatershed is the largest in the Little White Salmon River hydrologic unit. The subwatershed is located on the east side of the crest of the Cascade Range in the southwest quadrant of Skamania County.

4.4.10.2 Reaches

Lava Creek, Unnamed Tributary (UT): This short reach flows north to south until it flows into the mainstem of Lava Creek. Its downstream location is 45.7924/-121.6720, and its upstream location is 45.7955/-121.6723. This reach is not a shoreline of statewide significance.

Lava Creek (Reach #1): The upper reach of Lava Creek flows approximately 10.2 miles north to south along the east side of the Cascade Range and includes the associated wetlands upstream of the reach break that extend to the southeast along non-jurisdictional tributary Lost Creek. Its downstream location is 45.7924/-121.6720, and its upstream location is 45.9148/-121.7162. A portion of this reach is a shoreline of statewide significance.

Lava Creek (Reach #2): The lower reach of Lava Creek flows approximately 2.94 miles until its confluence at the Little White Salmon River near the town of Willard, Washington. Its downstream location is 45.7814/-121.6280, and its upstream location is 45.7924/-121.6720. This reach is a shoreline of statewide significance.

Goose Lake Outlet: The stream flows southeast from Goose Lake to its confluence at Lost Creek. Its downstream location is 45.9148/-121.7162, and its upstream location is 45.9390/-121.7580. This reach is not a shoreline of statewide significance.

Goose Lake: Goose Lake is located east of Red Mountain. The center of this waterbody is at 45.9411/-121.7644. This reach is not a shoreline of statewide significance.

Unnamed Lake #1: This small lake is located between the east sides of Red Mountain and Gifford Peak, just east of the Pacific Crest Trail and north of Unnamed Lake #2. The center of this waterbody is at 45.9602/-121.7932. This reach is not a shoreline of statewide significance.

Unnamed Lake #2: This small lake is located between the east sides of Red Mountain and Gifford Peak, southeast of the Pacific Crest Trail. The center of this waterbody is at 45.9537/-121.7980. This reach is not a shoreline of statewide significance.

4.4.10.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed is listed in Table 4-72.

Table 4-72. Surficial Geology and Soil Types - Lava Creek (170701050902)

Type	Percent
Surficial Geology	
Basalt Flows	56.5%
Volcaniclastic Deposits or Rocks	24.1%
Alpine Glacial Till (Fraser-Age)	5.7%
Andesite Flows	5.0%
Alpine Glacial Till (Pre-Fraser)	3.0%
Diorite	2.8%
Alluvium	1.5%
Tuffs and Tuff Breccias, Basaltic Andesite Flows, Alpine Glacial Outwash (Fraser-Age), Water, Intrusive Dacite, Intrusive Basaltic Andesite, Basalt Flows (Grande Ronde Basalt, Undivided [CRB]), and Basic (Mafic) Intrusive Rocks	Less than 1% each
Soil Types	
Unclassified Soil	34.4%
Andic Haplumbrepts	28.3%
Typic Vitricryands	10.4%
Typic Udivtrands	6.4%
Andic Cryumbrepts (Med/Lo-SK, M)	5.7%
Lithic Orthents, Andepts, Cryands, and Udands	3.4%
Orthents, Andepts, and Cryands	2.1%
Aquic Vitricryands (Ashy/Med-SK)	1.7%
Andic Haplumbrepts (Med/Lo, M, FRG)	1.3%
Aquolls, Fibrists, and Aquods	1.1%

Type	Percent
Underwood loam (30 to 50% slopes); Timberhead gravelly loam (30 to 65% slopes); Stabler loam (0 to 8% slopes); St. Martin gravelly loam (30 to 65% slopes); McElroy very stony loam (5 to 15% slopes); Underwood loam (2 to 15% slopes); Chemawa loam (2 to 8% slopes); Rock outcrop-Xerorthents complex (50 to 90% slopes); Undusk gravelly loam (30 to 65% slopes); Chemawa loam (15 to 30% slopes); Timberhead gravelly loam (5 to 30% slopes); Chemawa loam (30 to 50% slopes); Stabler loam (8 to 30% slopes); Chemawa loam (8 to 15% slopes); and water	1% or less of each

The subwatershed contains 1.15 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of forested woodland (87.8 percent), recently disturbed or modified land (11 percent), and less than 1 percent each of the following: agriculture, developed/other human use, nonvascular or sparse vascular rock vegetation, open water, and shrubland and/or grassland.

4.4.10.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater emergent wetland, lake, freshwater pond, "other" type of wetland, herbaceous bald, talus slopes, cave or cave-rich areas, as well as known concentrations of elk, Columbian black-tailed deer, and mule deer.

The PHS species identified within the subwatershed include northern spotted owl, bald eagle, northern goshawk, western toad, Townsend's big-eared bat, Chinquapin hairstreak butterfly, harlequin duck, fisher, long-legged myotis, Larch Mountain salamander, purple martin, and Cascade Torrent salamander. The non-PHS species within the subwatershed include tailed frog, osprey, Cascades frog, and Cope's giant salamander.

The subwatershed also includes total of 342.55 acres of wetlands. These wetlands include freshwater forested/shrub wetland (42.7 percent), freshwater emergent wetland (30.1 percent), lake (15.3 percent), freshwater pond (11.6 percent), and other (less than 1 percent).

4.4.10.5 Land Use and Altered Conditions

The existing land uses within the subwatershed consist of government services (98 percent); mining and extraction establishments (2 percent); and less than 1 percent of residence or accommodation functions or undefined uses. Approximately 2 percent of the subwatershed is privately owned, while 98 percent is publicly owned. While 95.6 percent of the subwatershed is unzoned, forest constitutes 4.4 percent and less than 1 percent is in each of the following zones: open space/conservancy, residential-higher density, and residential-lower density.

The subwatershed has approximately 115.88 miles of roads and a road density of 2.15 miles per square mile. There are approximately 31,370 square feet of impervious surface for structures, and 19,592,979 square feet of impervious road surfaces, which total 19,624,349 square feet of impervious area.

There are 98 known archaeological, cultural, or historical resources within the subwatershed.

The subwatershed has one wellhead protection area associated with Group A and Group B wells. There are no 303(d) listings or state cleanup site listings within the subwatershed.

Lava Creek, U T
This shoreline waterbody totals 0.24 stream miles and has 12.05 acres of jurisdictional area. The only existing land use within Lava Creek, U T is services-government, and all of this reach is publicly owned. All of the reach is zoned forest.

There are no impervious surfaces in this reach. No additional altered conditions are known to be present within this reach.

Lava Creek (Reach #1)
This shoreline waterbody totals 10.2 stream miles and has 585.57 acres of jurisdictional area. The only existing land use within Lava Creek Reach #1 is government services. The reach is 99.8 percent publicly owned and 0.2 percent privately owned. Most (85.7 percent) of the reach is unzoned, with the remainder (14.3 percent) zoned forest.

There are approximately 1.14 miles of roads in the reach, which has 223,319 square feet of impervious road surfaces and no impervious surfaces associated with structures. No additional altered conditions are known to be present within this reach.

Lava Creek (Reach #2)
This shoreline waterbody totals 2.94 stream miles and 139.21 acres of jurisdictional area. The existing land uses within Lava Creek Reach #2 are government services (47.6 percent), mining and extraction establishments (48 percent), and residence or accommodation functions (3.6 percent), with less than 1 percent undefined. Approximately 51.6 percent of the reach is privately owned and 48.4 percent is publicly owned. In terms of zoning, the reach is 97.3 percent forest, with 2 percent residential-lower density, and less than 1 percent residential- higher density.

There is only approximately 0.44 mile of roads within the reach. It has approximately 6,386 square feet of impervious surface in structures and 82,926 square feet in impervious road surfaces, for a total of 89,312 square feet. No additional altered conditions are known to be present within this reach.

Goose Lake Outlet
This shoreline waterbody totals 3.19 total stream miles and 153.07 acres of jurisdictional area. The only existing land use within Goose Lake Outlet is government services and all of this reach is publicly owned. The reach is entirely unzoned.

There is approximately 0.45 mile of roads within the reach, which has 73,044 square feet of impervious road surfaces and no additional impervious surface for structures. No additional altered conditions are known to be present within this reach.

Goose Lake
This shoreline waterbody totals 73.64 acres and 115.23 acres of jurisdictional area. The only existing land use within Goose Lake is government services, including the Goose Lake Campground for public access and water-enjoyment recreation, and all of the reach is publicly owned. The reach is entirely unzoned.

The reach has approximately 0.57 mile of roads and a road density of 3.17 miles per square mile. The reach has 106,553 square feet of impervious road surfaces and no additional impervious surface for structures. This reach has a wellhead protection area. No additional altered conditions are known to be present within this reach.

Unnamed Lake #1
This shoreline waterbody totals 22.64 acres and has 48.14 acres of jurisdictional area. The only existing land use within Unnamed Lake #1 is government services, and all of this reach is publicly owned. The reach is entirely unzoned.

The reach has approximately 247 square feet of impervious road surfaces and no additional impervious surface for structures. No additional altered conditions are known to be present within this reach.

Unnamed Lake #2
This shoreline waterbody totals 23.29 acres and has 48.18 acres of jurisdictional area. The only existing land use within Unnamed Lake #2 is government services, and all of this reach is publicly owned. The reach is entirely unzoned.The reach has no impervious area in structures or road surfaces. No additional altered conditions are known to be present within this reach.

4.4.10.6 Public Access
The subwatershed has 12.53 miles of trails and cannot be accessed easily from State Highway 14 or SR 141. However, several USFS roads and local roads, including South Prairie Road and Lost Creek Road/NF-66, give access to the subwatershed. Goose Lake Campground boat launch provides direct physical access to public waters, the lake-side campsites provide visual access.

4.4.10.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition, but Lava Creek has been affected primarily by forestry activities. Restoration opportunities include protecting the following components to prevent further degradation: floodplain function and channel migration processes; access to habitats; instream flows through management of water withdrawals; water quality; and natural stream flow regime.

Restoring the natural riparian plant community and eradicating invasive plant species from riparian areas could also help restore riparian conditions within Lava Creek. The addition of stable woody debris or structural modifications to channel morphology in Lava Creek could restore channel structure and stability and enhance pool formation and sediment sorting (Lower Columbia Fish Recovery Board 2004).

4.4.11 Upper Little White Salmon River (170701050903) – Map Sheets 4 and 6a

4.4.11.1 Overview

Upper Little White Salmon River (170701050903) has approximately 8,923.9 total acres, 154.17 acres of shoreline jurisdictional area, and 2.93 miles of streams. Using WGS 84, the subwatershed's downstream location is 45.8615/-121.6425. The subwatershed is near the west flanks of the Monte Cristo Range and largely within the Gifford Pinchot National Forest. The subwatershed borders Klickitat County to the east.

4.4.11.2 Reaches

Little White Salmon River (Reach #1): This reach is the upper mainstem of the Little White Salmon River within Skamania County; its headwaters are in Klickitat County. Its downstream location is 45.8615/-121.6425, and its upstream location is 45.8807/-121.6126. This reach is not a shoreline of statewide significance.

Lusk Creek: Lusk Creek flows north to south until its confluence with the Little White Salmon River. Its downstream location is 45.8615/-121.6425, and its upstream location is 45.8713/-121.6445. This reach is not a shoreline of statewide significance.

4.4.11.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed is listed in Table 4-73.

Table 4-73. Surficial Geology and Soil Types - Upper Little White Salmon River (170701050903)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	87.4%
Alluvium	4.2%
Diorite	3.4%
Basalt Flows (Grande Ronde Basalt)	3.0%
Mass-Wasting Deposits (Mostly Landslides)	1.9%

Type	Percent
Soil Types	
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	52.2%
Andic Haplumbrepts (Med/C, M, FRG)	22.6%
Lithic Orthents, Andepts, Cryands, and Udands	8.8%
Underwood Loam (30 to 50 percent slopes)	4.1%
Andic Haplumbrepts (Med/Lo, M, FRG)	3.9%
Typic Hapludands (Med, M, MES)	2.8%
Underwood Loam (2 to 15 percent slopes);	2.4%
McElroy Gravelly Loam (5 to 15 percent slopes)	1.1%
Timberhead gravelly loam (5 to 30% slopes); Undusk gravelly loam (30 to 65% slopes); Stabler loam (0 to 8% slopes); riverwash; Andic Cryumbrepts (Med/Lo-SK, M); Aquolls, Fibrists, and Aquods; and McElroy gravelly loam (30 to 65% slopes)	Less than 1% each

The subwatershed has approximately 168.06 acres of landslide hazard zones. No acres of the subwatershed are within the 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of 76.8 percent forested woodland, 22.9 percent recently disturbed or modified land, and less than one percent of agriculture and developed/other human use.

4.4.11.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, riverine wetland, freshwater pond, talus slopes, and Columbian black-tailed deer and elk habitat. The PHS species within the subwatershed include northern spotted owl, northern goshawk, western gray squirrel, and western toad.

A total of 73.71 acres of wetlands were identified within the subwatershed. These wetlands are 90.7 percent freshwater forested/shrub wetland, 8.7 percent riverine wetland, and less than one percent freshwater pond.

4.4.11.5 Land Use and Altered Conditions

The existing land use within the subwatershed includes 96.1 percent government services and 3.9 percent mining and extraction establishments. Approximately 3.9 percent of the subwatershed is privately owned and 96.1 percent is publicly owned. In terms of zoning, the watershed is 82.4 percent unzoned and 17.6 percent forest.

The subwatershed has approximately 40.5 miles of roads and a road density of 2.9 miles per square mile. The subwatershed has approximately 889 square feet of impervious structural surfaces and 6,461,959 square feet of impervious road surfaces for a total of 6,462,848 square feet of impervious area.

There are seven known archaeological, cultural, or historical resources within the subwatershed.

The subwatershed has two wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Little White Salmon River (Reach #1)
This shoreline waterbody totals 2.17 total stream miles and has 108.85 acres of jurisdictional area. The existing land uses within Little White Salmon River (Reach #1) are 40.3 percent mining and extraction establishments and 59.7 percent government servicesApproximately 59.7 percent of the reach is privately owned and 40.3 percent is publicly owned. In terms of zoning, the reach is 50.5 percent forest and 49.5 percent unzoned.

There are approximately 0.89 miles of roads within the reach. It has approximately 889 square feet of impervious surface for structures and 159,434 square feet of impervious road surfaces, for a total of 160,322 square feet of impervious area. This reach has a State 303d listing for temperature. No additional altered conditions are known to be present within this reach.

Lusk Creek
This shoreline waterbody totals 0.76 stream miles and has 45.32 acres of jurisdictional area. The existing land uses within Lusk Creek are 90.7 percent mining and extraction establishments and 9.3 percent government services. Approximately 90.7 percent of the reach is privately owned and 9.3 percent is publicly owned. In terms of zoning, the reach is 90.9 percent forest and 9.1 percent unzoned.

There are approximately 0.40 miles of roads within the reach. It has approximately 68,145 square feet of impervious road surfaces and no additional impervious surface area of structures. No additional altered conditions are known to be present within this reach.

4.4.11.6 Public Access
The subwatershed has 1.53 miles of trails. The subwatershed is relatively inaccessible from SR 141 but has access available from a number of USFS roads off Oklahoma Road.

4.4.11.7 Restoration Opportunities
The upper mainstems of the Little White Salmon River and Lusk Creek have been impacted primarily by forestry and past timber harvest activities. Additionally, ecological functions have been significantly altered and/or adversely impacted according to the 303(d) listing associated with temperature within the subwatershed.

Restoration opportunities include the protection of the following components to prevent further degradation: floodplain function and channel migration processes; access to habitats; instream flows through management of water withdrawals; water quality; and the natural stream flow regime. Restoring the natural riparian plant community and eradicating invasive plant species from riparian areas could also help restore riparian conditions within these areas. The addition of stable woody debris or structural modifications to channel morphology in these areas could restore channel structure and stability, and enhance pool formation and sediment sorting. Also, near the Lusk Creek confluence, increased riparian shading and decreased channel width-to-depth ratios could improve water quality – temperature impairments in particular (Lower Columbia Fish Recovery Board 2004).

4.4.12 Middle Little White Salmon River (170701050904) – Map Sheet 6a

4.4.12.1 Overview

Middle Little White Salmon River (170701050904) has approximately 12,272.88 total acres, 633.21 acres of shoreline jurisdictional area, and 10.53 miles of streams. Using WGS 84, the subwatershed's downstream location is 45.7814/-121.6280, and its upstream location is 45.8615/-121.6425. The subwatershed includes the middle stretch of the Little White Salmon River as well as Moss Creek. Small portions of the subwatershed border Klickitat County to the east.

4.4.12.2 Reaches

Little White Salmon River (Reach #2): At 6.56 miles, this reach is the longest of the four reaches that comprise the Little White Salmon River, includes extensive associated wetlands, and is located within the Gifford Pinchot National Forest. The river flows south from its confluence with Lusk Creek at the subwatershed boundary to the confluence of Moss Creek. Its downstream location is 45.7982/-121.6395, and its upstream location is 45.8615/-121.6425. This reach is not a shoreline of statewide significance.

Little White Salmon River (Reach #3): This reach is approximately 1.8 miles long and continues downstream to the town of Willard. Its downstream location is 45.7815/-121.6280, and its upstream location is 45.7982/-121.6395. This reach is not a shoreline of statewide significance.

Moss Creek: This reach is one of the major tributaries to the Little White Salmon River and its confluence is located near the town of Willard. The jurisdictional reach only includes the final 2.16 downstream miles due to the 20 cfs requirement. Its downstream location is 45.7982/-121.6395, and its upstream location is 45.8046/-121.6699. This reach is not a shoreline of statewide significance.

4.4.12.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed is listed in Table 4-74.

Table 4-74. Surficial Geology and Soil Types - Middle Little White Salmon River (170701050904)

Type	Percent
Surficial Geology	
Volcaniclastic Deposits or Rocks	58.1%
Grande Ronde Basalt Flows	11.7%
Alluvium	10.0%
Intrusive Basaltic Andesite	9.8%
Diorite	5.0%
Basalt Flows	4.5%
Basic (Mafic) Intrusive Rocks	Less than 1%
Soil Types	
McElroy Gravelly Loam (30 to 65% slopes)	20%
Andic Haplumbrepts (Med/C, M, FRG)	18.3%
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	15.2%
Undusk Gravelly Loam (30 to 65% slopes)	8.6%
Stabler Loam (0 to 8% slopes)	7.6%
Underwood Loam (30 to 50% slopes)	6.7%
Underwood Loam (2 to 15% slopes)	6.7%
Timberhead Gravelly Loam (30 to 65% slopes)	3.5%
McDoug Silt Loam	3.4%
Typic Hapludands (Med, M, MES)	2.6%
Underwood loam (15 to 30% slopes)	1.8%
Lithic Orthents, Andepts, Cryands, and Udands	1.3%
Riverwash	1.3%
Undusk Gravelly Loam (5 to 30% slopes), Rock Outcrop-Xerorthents Complex (50 to 90% slopes), Xerorthents-Rock Outcrop Complex (50 to 90% slopes), Andic Cryumbrepts (Med/Lo-SK, M), McElroy Gravelly Loam (5 to 15% slopes), Pits; Chemawa Loam (2 to 8% slopes), Andic Haplumbrepts (Med/Lo, M, FRG), Water, and Stabler Loam (8 to 30% slopes)	Less than 1% each

No acres of the subwatershed are within a landslide hazard zone. The subwatershed has 4.38 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of 81.6 percent forested woodland, 1.7 percent agriculture, 16.1 percent recently disturbed or modified land, and less than one percent of the following: developed/other human use; nonvascular or sparse vascular rock vegetation; and shrubland and/or grassland.

4.4.12.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, riverine wetland, freshwater pond, freshwater emergent wetland, "other" type of wetland, talus slopes, Columbian black-tailed deer, elk, and Larch Mountain salamander. The PHS species within the subwatershed include northern spotted owl, harlequin duck, Larch Mountain salamander, and Cascade Torrent salamander.

A total of 343.03 acres of wetlands were identified within the subwatershed. These wetlands include 71.6 percent freshwater forested/shrub wetland, 26.2 percent riverine, 1.5 percent freshwater pond, and less than one percent of each of the following: freshwater emergent wetland and "other" type of wetland.

4.4.12.5 Land Use and Altered Conditions

The existing land use within the subwatershed includes 80.4 percent government services, 16.8 percent mining and extraction establishments, 2 percent residence or accommodation functions, and less than one percent of each of the following: agriculture, forestry, fishing and hunting, and undefined. Approximately 19.5 percent of the subwatershed is privately owned and 80.5 percent is publicly owned. In terms of zoning, the watershed is 58.5 percent forest, 35.7 percent unzoned, 5.6 percent residential - lower density, and less than one percent residential - higher density.

The subwatershed has approximately 65.07 miles of roads and a road density of 3.39 miles per square mile. The subwatershed has approximately 69,200 square feet of impervious structural surfaces and 10,712,686 square feet of impervious road surfaces for a total of 10,781,887 square feet of impervious areas.

Known archaeological, cultural, or historical resources within the subwatershed include 10 archaeological sites.

The subwatershed has four wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with temperature within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016).

Little White Salmon River (Reach #2)

This shoreline waterbody is a total of 6.56 total stream miles and has 433.15 acres of jurisdictional area. The existing land uses within Little White Salmon River (Reach #2) jurisdiction are 46.3 percent mining and extraction establishments; 38.7 percent government services; 12.9 percent residence or accommodation functions; and 2.0 percent agriculture, forestry, fishing, and hunting. Approximately 61.2 percent of the reach is privately owned and 38.8 percent is publicly owned. In terms of zoning, the reach is 66.4 percent forest, 33.1 percent residential - lower density, and less than 1 percent unzoned. This reach includes the Moss Creek Campground.

There are approximately 1.91 miles of roads and a road density of 2.83 miles per square mile within the reach. It has approximately 2,994 square feet of impervious structural surfaces and 358,601 square feet of impervious road surfaces for a total of 361,595 square feet of impervious areas. There are two State 303d listings for

temperature within this reach. No additional altered conditions are known to be present within this reach.

Little White Salmon River (Reach #3)
This shoreline waterbody is a total of 1.8 total stream miles and has 89.59 acres of jurisdictional area. The existing land uses within Little White Salmon River (Reach #3) are 44.6 percent mining and extraction establishments; 36.8 percent government services; 14.8 percent residence or accommodation functions; 2.3 percent agriculture, forestry, fishing, and hunting; and 1.5 percent undefined. Approximately 61.6 percent of the reach is privately owned and 38.4 percent is publicly owned. In terms of zoning, the reach is 63.7 percent forest, 20.3 percent residential - higher density, and 16 percent residential - lower density.

There are approximately 0.15 miles of roads and a road density of 1.14 miles per square mile within the reach. It has approximately 4,578 square feet of impervious structural surfaces and 40,525 square feet of impervious road surfaces for a total of 45,103 square feet of impervious areas. There is a State 303d listing for temperature within this reach. No additional altered conditions are known to be present within this reach.

Moss Creek
This shoreline waterbody is a total of 2.16 total stream miles and has 104.19 acres of jurisdictional area. The existing land use within Moss Creek is 71.5 percent government services, 26.1 percent mining and extraction establishments, and 2.4 percent residence or accommodation functions. Approximately 71.5 percent of the reach is privately owned and 28.5 percent is publicly owned. In terms of zoning, the reach is 96.1 percent forest, 2.4 percent residential - lower density, and 1.5 percent unzoned.

There are approximately 0.24 miles of roads and a road density of 1.47 miles per square mile within the reach. It has approximately 2,546 square feet of impervious structural surfaces and 40,543 square feet of impervious road surfaces for a total of 43,089 square feet of impervious areas. No additional altered conditions are known to be present within this reach.

4.4.12.6 Public Access
The subwatershed does not have any documented public access. Oklahoma Road runs parallel to the Little White Salmon River, but there are no formal access points. Moss Creek Campground provides physical & visual shoreline access to Little White Salmon River

4.4.12.7 Restoration Opportunities
Moss Creek has been impacted primarily by forestry and past timber harvest activities. Additionally, ecological functions have been significantly altered and/or adversely impacted according to the two 303(d) listings associated with temperature

within the subwatershed. Restoration opportunities include the protection of the following components to prevent further degradation: floodplain function and channel migration processes; access to habitats; instream flows through management of water withdrawals; water quality; and the natural stream flow regime. Restoring the natural riparian plant community and eradicating invasive plant species from riparian areas could also help restore riparian conditions within Moss Creek. Also within Moss Creek, the addition of stable woody debris or structural modifications to channel morphology could restore channel structure and stability and enhance pool formation and sediment sorting (Lower Columbia Fish Recovery Board 2004).

4.4.13 Lower Little White Salmon River (170701050905) – Map Sheet 6c

4.4.13.1 Overview

The Lower Little White Salmon River (170701050905) is approximately 16,618.17 total acres, including 581.4 acres of shoreline jurisdictional area and 226.94 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's central location is 45.7133/-121.6363. This subwatershed is located on the north bank of the Columbia River just east of Cook. The subwatershed includes the southern-most section of the Little White Salmon River and Drano Lake, a popular fishing spot for steelhead.

Drano Lake (BergerABAM, Inc. 2015)

4.4.13.2 Reaches

Little White Salmon River (Reach #4): This reach includes the Little White Salmon River from the town of Willard south to the Little White Salmon Fish Hatchery

before its terminus at Drano Lake. This reach includes Spirit Falls, a 37-foot waterfall just north of the hatchery. Its downstream location is 45.7230/-121.6393, and its upstream location is 45.7815/-121.6280. This reach is a shoreline of statewide significance.

Drano Lake: Drano Lake is not a natural lake, but a backwater created by the impoundment of the Columbia River when the Bonneville Dam was constructed. Drano Lake is landward of the SR 14 and BNSF railroad causeway and enters the Bonneville Reservoir at RM 162 at the southwest end of the Lake. The center of this waterbody is at 45.7134/-121.6364. This reach is not a shoreline of statewide significance.

4.4.13.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types of the subwatershed is listed in Table 4-75.

Table 4-75. Surficial Geology and Soil Types - Lower Little White Salmon River (170701050905)

Type	Percent
Surficial Geology	
Grande Ronde Basalt Flows	36.7%
Basalt Flows	23.5%
Mass-Wasting Deposits (mostly landslides)	18.4%
Tuffs and Tuff Breccias	15.4%
Outburst Flood Deposits, Sand and Silt, Late Wisconsinan	3.5%
Water	1.4%
Artificial Fill, Continental Sedimentary Deposits or Rocks, Intrusive Dacite, and Volcaniclastic Deposits or Rocks	Less than 1% each
Soil Types	
McElroy Gravelly Loam (30 to 65% slopes)	25.1%
Chemawa Loam (2 to 8% slopes)	13.0%
Underwood Loam (15 to 30% slopes)	6.8%
Chemawa Loam (15 to 30% slopes)	6.1%
Undusk Gravelly Loam (30 to 65% slopes)	6.0%
Underwood Loam (30 to 50% slopes)	5.9%
Underwood Loam (2 to 15% slopes)	4.6%
Undusk Gravelly Loam (5 to 30% slopes)	4.3%
McElroy Gravelly Loam (15 to 30% slopes)	3.7%
St. Martin Gravelly Silty Clay Loam (30 to 65% slopes)	3.3%
Andic Haplumbrepts (Med/Lo-Sk, M, FRG),	3.1%
Rock Outcrop-Xerorthents Complex (50 to 90% slopes)	3.0%
Timberhead Gravelly Loam (30 to 65% slopes)	2.2%
McElroy Gravelly Loam (5 to 15% slopes)	1.9%
Chemawa Loam (8 to 15% slopes)	1.9%
Andic Haplumbrepts (Med/C, M, Frg)	1.8%
Water	1.8%
Timberhead Gravelly Loam (5 to 30% slopes)	1.5%

Type	Percent
St. Martin Gravelly Silty Clay Loam (15 to 30% slopes)	1.1%
Rock Outcrop-Rubbleland Complex; Lithic Orthents, Andepts, Cryands, and Udands; Xerorthents-Rock Outcrop Complex (50 to 90% slopes); Stabler Loam (8 To 30% slopes); Chemawa Loam (30 to 50% slopes); Washougal Gravelly Loam (2 to 8% slopes); Stabler Loam (0 to 8% slopes); and St. Martin Gravelly Silty Clay Loam (2 to 15% slopes).	Less than1% of each

The subwatershed has approximately 2,504 acres of landslide hazard zones, and also contains 394.67 acres of 100-year FEMA floodplain.

Vegetated cover within the subwatershed is composed of 73.5 percent forested woodland, 4.9 percent agriculture, less than 1 percent developed/other human use, l percent nonvascular or sparse vascular rock vegetation, 1.7 percent open water, 17.4 percent recently disturbed or modified land, and 1.2 percent shrubland and/or grassland.

4.4.13.4 Biological Resources

The PHS species identified within the subwatershed include lake, freshwater emergent wetland, freshwater pond, freshwater forested/scrub-scrub wetland, bald eagle, spotted owl, western toad, California mountain kingsnake, sand roller, and Larch Mountain salamander. The priority habitat types within the subwatershed include cliffs/bluffs, herbaceous balds, and talus slopes, as well as known concentrations of Columbian black-tailed deer, mule deer, elk, Larch Mountain salamander, and waterfowl. The Little White Salmon provides approximately 1.21 stream miles of habitat for winter steelhead within the subwatershed.

In addition, a total of 249 acres of wetlands were identified within the subwatershed. These wetlands include 91.5 percent lake, 4 percent freshwater emergent, 3.8 percent freshwater pond, and 0.6 percent freshwater forested/shrub-scrub wetlands.

4.4.13.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 64 percent mining and extraction establishments; 19.9 percent government services; 7.9 percent agriculture, forestry, fishing, and hunting uses; 5.9 percent residence or accommodation functions; 1.7 percent undefined; and less than 1 percent transportation, communication, information, and utilities. Approximately 78.4 percent of the subwatershed is privately owned and 21.6 percent is publicly owned. In terms of zoning, the subwatershed is 50.9 percent forest, 17.4 percent residential – lower density, 10.7 percent unzoned, 9.9 percent residential – higher density, 5.4 percent open space/conservancy, 4 percent agriculture, and 1.7 percent water.

The subwatershed has approximately 150.76 miles of roads with a road density of 7.01 miles per square mile. The subwatershed has approximately 768,587 square feet of impervious structural surfaces and 23,973,179 square feet of impervious road

surfaces for a total of 24,741,766 square feet of impervious area. The subwatershed has one bridge on SR 14 over the Little White Salmon River; data for bridges on County or other roads was not available.

Known archaeological, cultural, or historical resources within the subwatershed include 13 historic properties, six archaeological sites, and one cemetery.

The subwatershed has three wellhead protection areas associated with Group A and Group B wells. There are no 303(d) listings or state cleanup site listings within the watershed.

The dams within the subwatershed include the Little White Salmon Hatchery Dam, which is located approximately 12.5 miles east of Stevenson on SR 14 (45.7215/-121.6429) and the Willard Hatchery Diversion Dam, which is located 5 miles north of SR 14 up the west end of the Cook-Underwood Road on the Little White Salmon River (45.7665/-121.6329).

Little White Salmon River (Reach #4)

The reach has 5.1 total stream miles and 247.9 acres of jurisdictional area. The existing land uses within Little White Salmon River are 84.1 percent mining and extraction establishments; 14.8 percent government services; and less than 1 percent each of: residence or accommodation functions; transportation, communication, information, and utilities; and agriculture, forestry, fishing, and hunting. Approximately 85.2 percent of the reach is privately owned and 14.8 percent is publicly owned. In terms of zoning, the reach is 74.6 percent forest, 14 percent residential – higher density, 9.2 percent open space/conservancy, and 2.2 percent residential – lower density. National Fish Hatchery and dam are located along the southern extent of this reach just upstream of the river mouth at Drano Lake.

There are approximately 0.47 miles of roads with a road density of 1.2 miles per square mile within the reach. It has approximately 57,596 square feet of impervious surface for structures and 86,211 square feet of impervious road surfaces for a total of 143,807 square feet of impervious area. This reach has a wellhead protection area. No additional altered conditions are known to be present within this reach.

Drano Lake

This shoreline waterbody is a total of 226.9 acres and has 333.5 acres of jurisdictional area. The existing land use within Drano Lake is 54.1 percent undefined, 28.9 percent government services; 14.1 percent agriculture, forestry, fishing, and hunting; and 2.9 percent transportation, communication, information, and utilities. Approximately 17 percent of the reach is privately owned and 83 percent is publicly owned. In terms of zoning, the reach is 71.2 percent water, 27.7 percent open space/conservancy, and 1.1 percent public recreation. In-water use includes log storage. Shoreline modifications

include the SR 14/BNSF bridge, and the public boat launch ramp, pier, dock, and the parking lot built on fill, which are all located waterward of SR 14.

The lake reach has approximately 2.86 miles of roads with a road density of 5.5 miles per square mile. It has approximately 72,264 square feet of impervious surface for structures, and 641,837 square feet of impervious road surfaces for a total of 714,102 square feet of impervious area. No additional altered conditions are known to be present within this reach.

4.4.13.6 Public Access

The subwatershed has 0.22 miles of trails within the 13,618 total acres. There is one boat ramp located at Drano Lake (Drano Lake Boat Ramp) within the subwatershed. The National Fish Hatchery allows for some limited physical/visual access. Drano Lake and the lower mainstem of the Little White Salmon River are accessible from SR 14. The remainder of the subwatershed is fairly inaccessible.

4.4.13.7 Restoration opportunities

Ecological conditions within this subwatershed are generally in good condition, but restoration opportunities could include potential sites within and downstream of the hatchery complex for the creation of new habitats such as spawning channels to compensate for lost or currently inaccessible habitat. The reach from the lower mainstem of the Little White Salmon River to Drano Lake has been affected by the development of hatchery facilities and past log flume operations. Measures could include the protection of the following components to prevent further degradation: floodplain function and channel migration processes; riparian function; access to habitats; instream flows through management of water withdrawals; channel structure and stability; water quality; and the natural stream flow regime (Lower Columbia Fish Recovery Board 2004).

4.4.14 Headwaters Wind River (170701051001) – Map Sheet 3

4.4.14.1 Overview

The Headwaters Wind River HUC (170701051001) is approximately 20,122 total acres in area with 123.42 acres of shoreline jurisdictional area and 72.54 acres of shoreline jurisdictional waterbodies. The subwatershed is located in the central portion of Skamania County along the western flanks of the Cascade Mountains, southeast of Swift Reservoir. The entire subwatershed is located in the Gifford Pinchot National Forest. This HUC includes one waterbody and no streams in shoreline jurisdiction.

4.4.14.2 Reaches

McClellan Meadows: This reach is a freshwater emergent wetland that comprises the headwaters of the Wind River. The center of this waterbody is at 45.9992/-121.8917. This reach is not a shoreline of statewide significance.

4.4.14.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-76.

Table 4-76. Surficial Geology and Soil Types - Headwaters Wind River (170701051001)

Type	Percent
Surficial Geology	
Andesite Flows	36.8%
Basalt Flows	12.3%
Tuffs and Tuff Breccias	15.3%
Volcanoclastic Deposits or Rocks	15%
Alpine Glacial Till	4.5%
Alluvium	2.2%
Mass-Wasting Deposits, Mostly Landslides	1.1%
Intrusive Dacite, Water, and Intrusive Basaltic Andesite	Less than 1% each
Soil Types	
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	30.2%
Andic Haplumbrepts (Med/C, M, FRG)	18.0%
Typic Udivitrands (Pum, M, FRG)	16.5%
Aquic Vitricryands (Ashy/Med-SK)	9.4%
Typic Vitricryands (Ashy/Med-SK)	7.0%
Typic Vitricryands (Pum, M)	6.7%
Lithic Othents, Andepts, Cryands, and Udands	3.7%
Typic Vitricryands (PUM)	2.3%
Typic Hapludands (Med, M, MES)	1.6%
Aquolls, Fibrists, and Aquods	1.4%
Andic Haplumbrepts (Med/Lo, M, FRG); Vitric Halocryands (Cind/Med); Andic cryumbrepts (Med/Lo-SK, M); and Lithic Orthents	Less than 1% each

The subwatershed has approximately 224.46 acres of landslide hazard zones.

Vegetated cover within the subwatershed is composed of 71.1 percent forested woodland, 26.6 percent recently disturbed or modified land, 1.8 percent shrubland and/or grassland, and less than one percent of each of the following types: developed/other human use and nonvascular or sparse vascular rock vegetation.

4.4.14.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater emergent wetland, freshwater forested/shrub wtland, freshwater pond, "other" type of wetland, riverine wetland, talus slopes, herbaceous balds, and caves or cave-rich areas, as well as habitat for elk and harlequin duck. The PHS species within the subwatershed include northern spotted owl, northern goshawk, gray wolf, and Townsend's big-eared bat. The non-PHS species monitored within the subwatershed include the tailed frog.

Approximately 11.53 stream miles of Wind River summer steelhead and 3.85 stream miles of Wind River spring Chinook are found within the subwatershed. Historically, fish were limited to the lower Wind River until a fish ladder was constructed at Shipherd Falls (RM 2) that gave fish access to the upper watershed. Summer steelhead spawning occurs generally from early March through May while spring Chinook generally spawn between early August and mid-September (Lower Columbia Fish Recovery Board 2004).

In addition, a total of 238 NWI wetlands were identified within this subwatershed. They include approximately 46.9 percent freshwater emergent wetland, 34.3 percent freshwater forested shrub wetland, 12.9 percent riverine wetland, and 5.3 percent freshwater pond, and 1.1 percent "other" type of wetland.

4.4.14.5 Land Use and Altered Conditions

The only existing land use within the subwatershed is government services, and all of the subwatershed is publicly owned. In terms of zoning, almost all of the watershed is unzoned, with just 0.1 percent zoned forest.

The subwatershed has approximately 92.8 miles of roads and a road density of 2.95 miles per square mile. The subwatershed has approximately 680 square feet of impervious surface and 15,132,950 square feet of impervious road surfaces, for a total of 15,133,630 square feet of impervious areas.

The known archaeological, cultural, or historical resources within the subwatershed are one historic property and 86 archaeological sites.

The subwatershed has three wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

McClellan Meadows

This reach has a total of 72.54 acres of shoreline waterbody and 205.93 acres of jurisdictional area. The only existing land use within this reach is government services, and all of the reach is publicly owned. It is entirely unzoned.

The reach has approximately 0.15 miles of roads and a road density of 0.77 miles per square mile. It has approximately 21,368 square feet of impervious road surfaces and no additional square feet of impervious surface for structures. No additional altered conditions are known to be present within this reach.

4.4.14.6 Public Access

The subwatershed has 17.54 miles of trails. It is fairly inaccessible from state highways but access is available from Curly Creek Road/Wind River Road and USFS roads.

4.4.14.7 Restoration Opportunities

Restoration opportunities include restoring the natural riparian plant community and eradicating invasive plant species from riparian areas (Lower Columbia Fish Recovery Board 2004).

4.4.15 Falls Creek (170701051002) – Map Sheets 3 and 4

4.4.15.1 Overview

The Falls Creek HUC (170701051002) is approximately 13,910 total acres in an area with 746.94 acres of shoreline jurisdictional area including 7.43 miles of shoreline jurisdiction waterbodies and 117.23 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 45.9078/-121.9498. The subwatershed is located in the central portion of Skamania County along the western flanks of the Cascade Range. All of the HUC is located within the Gifford Pinchot National Forest.

4.4.15.2 Reaches

Falls Creek (Reach #1): This reach is the headwaters of Falls Creek until the confluence of Black Creek. Its downstream location is 45.9108/-121.8854, and its upstream location is 45.9504/-121.8648. This reach is not a shoreline of statewide significance.

Falls Creek (Reach #2): This reach begins at the confluence of Black Creek and continues downstream until its confluence with Wind River. Its downstream location is 45.9078/-121.9498, and its upstream location is 45.9108/-121.8854. The reach is not a shoreline of statewide significance.

Black Creek: This reach flows generally east to west until its confluence with Falls Creek. Its downstream location is 45.9108/-121.8854, and its upstream location is 45.9098/-121.8842. The reach is not a shoreline of statewide significance.

Black Creek Waterbody: This waterbody is located just north of Black Creek and east of that creek's confluence with Falls Creek. The center of this waterbody is at 45.9076/-121.8751. The reach is not a shoreline of statewide significance.

Unnamed Waterbody #1: This waterbody is located south of Black Creek and west of NF-6053. The center of this waterbody is at 45.9003/-121.8645. The reach is not a shoreline of statewide significance.

Unnamed Waterbody #2: This reach is located south of Black Creek and Carson Guler Road. The center of this waterbody is at 45.8923/-121.8562. The reach is not a shoreline of statewide significance.

4.4.15.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-77.

Table 4-77. Surficial Geology and Soil Types - Falls Creek (170701051002)

Type	Percent
Surficial Geology	
Basalt Flows	40.2%
Andesite Flows	30.9%
Tuffs and Tuff Breccias	10.8%
Basaltic Andesite Flows	7.1%
Alpine Glacial Till	7.5%
Water	1.9%
Volcanoclastic Deposits Or Rocks	1.3%
Continental Sedimentary Deposits or Rocks, Conglomerate	Less than 1%
Soil Types	
Typic udivitrands (Pum, M, FRG);	25.1%
Andic Haplumbrepts (Med/Lo-SK, M, FRG);	16.2%
Typic Vitricryands (Pum);	15.3%
Typic Vitricryands (Ashy/Med-SK);	11.9%
Typic Vitricryands (Pum, M);	10.4%
Aquic Vitricryands (Ashy/Med-SK)	9.9%
Orthents, Andepts, and Cryands	5.1%
Aquolls, Fibrists, and Aquods	2.9%
Lithic Orthents, Andepts, Cryands, and Udands	1.9%
Andic Haplumbrepts (Med/C, M, FRG); Andic Haplumbrepts (Med/Lo, M, FRG); and Lithic Orthents	Less than 1% each

Vegetated cover within the subwatershed is composed of 71.7 percent forested woodland, 27.6 percent recently disturbed or modified land, and less than one percent of the following types: developed/other human use, nonvascular or sparse vascular rock vegetation, and shrubland and/or grassland. See Map 5 for pCMZs within this subwatershed.

4.4.15.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater pond, freshwater emergent wetland, cave or cave-rich areas, herbaceous bald, as well as habitat for elk and harlequin ducks. The PHS species within the subwatershed include northern spotted owl, northern goshawk, and Townsend's big-eared bat. The non-PHS species monitored within the subwatershed include the Cascades frog.

Approximately 0.46 stream miles of Wind River summer steelhead and 0.37 stream miles of Wind River spring Chinook are found within the subwatershed. Historically, fish were limited to the lower Wind River until a fish ladder was constructed at Shipherd Falls (RM 2), giving fish access to the upper watershed. Summer steelhead spawning occurs generally from early March through May while spring Chinook generally spawn between early August and mid-September (Lower Columbia Fish Recovery Board 2004).

A total of 290.3 acres of NWI wetlands were identified within the subwatershed. These wetlands include 50.6 percent freshwater forested/shrub wetland, 31.6 percent freshwater pond, and 17.7 percent freshwater emergent wetland.

4.4.15.5 Land Use and Altered Conditions

The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

The subwatershed has approximately 47.85 miles of roads and a road density of 2.20 miles per square mile. It has approximately 5,939,447 square feet of impervious road surfaces, and no additional square feet of impervious area for structures.

Known archaeological, cultural, or historical resources within the subwatershed include 2 historic properties and 198 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Falls Creek Reach #1

This reach has a total of 3.59 jurisdictional stream miles and 187.42 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.76 miles of roads within the reach. It has approximately 117,020 square feet of impervious road surfaces, and no additional square feet of impervious area for structures. No additional altered conditions are known to be present within this reach.

Falls Creek Reach #2

This reach has a total of 3.75 jurisdictional stream miles and 195.89 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.16 miles of roads within the reach. It has approximately 30,910 square feet of impervious road surfaces, and no additional square feet of impervious area for structures. No additional altered conditions are known to be present within this reach.

Black Creek

This reach has a total of 0.09 jurisdictional stream miles and 6.46 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.23 miles of roads within the reach. It has approximately 37,747 square feet of impervious road surfaces, and no additional square feet of

impervious area for structures. No additional altered conditions are known to be present within this reach.

Black Creek Waterbody
This reach has a total of 55.76 acres of shoreline waterbody and 130.57 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.23 miles of roads within the reach. It has approximately 37,747 square feet of impervious road surfaces, and no additional square feet of impervious area for structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #1
This reach has a total of 28.96 acres of shoreline waterbody and 79.49 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #2
This reach has a total of 92.51 acres of shoreline waterbody and 148.30 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.33 miles of roads within the reach. It has approximately 55,276 square feet of impervious road surfaces, and no additional square feet of impervious area for structures. No additional altered conditions are known to be present within this reach.

4.4.15.6 Public Access
The subwatershed has 13.8 miles of trails. It is fairly inaccessible from state highways but access is available from Wind River Road, Carson Guler Road, and USFS roads.

4.4.15.7 Restoration Opportunities
Falls Creek is a moderately impaired subwatershed with respect to landscape conditions that influence sediment supply. High road densities, steep topography, and naturally unstable soils are the primary drivers of sediment impairment. Managing forest practices, growth, and development to minimize their impacts to sediment supply processes, runoff regime, and water supply can improve excessive fine sediment and turbidity, embedded substrates, water quality, and stream flow (Lower Columbia Fish Recovery Board 2004).

4.4.16 Dry Creek (170701051003) – Map Sheet 3

4.4.16.1 Overview

The Dry Creek HUC (170701051003) is approximately 9,937 total acres in area with 272 acres of shoreline jurisdictional area and 5.66 miles of shoreline jurisdiction waterbodies. Using WGS 84, the subwatershed's downstream location is 45.8805/-121.9782. This subwatershed is located south of Swift Reservoir within the Gifford Pinchot National Forest.

4.4.16.2 Reaches

Big Hollow Creek: This reach flows from northwest to southeast until its confluence with Dry Creek. Its downstream location is 45.9220/-121.9816, and its upstream location is 45.9398/-122.0047. This reach is not a shoreline of statewide significance.

Dry Creek: This reach begins at the confluence of Dry Creek until its confluence with the Wind River. Its downstream location is 45.8805/-121.9782, and its upstream location is 45.9220/-121.9816. This reach is not a shoreline of statewide significance.

4.4.16.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-78.

Table 4-78. Surficial Geology and Soil Types - Dry Creek (170701051003)

Type	Percent
Surficial Geology	
Volcanoclastic Deposits or Rocks	54.4%
Andesite Flows	19.5%
Tuffs and Tuff Breccias	15.7%
Alluvium	3.7%
Basalt Flows	2.9%
Alpine Glacial Drift	2.6%
Diorite; Intrusive Andesite; Mass-Wasting Deposits, Mostly Landslides; and Intrusive Dacite	Less than 1% each
Soil Types	
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	41.2%
Andic Haplumbrepts (Med/C, M, FRG)	31.14%
Typic Hapludands (Med, M, MES)	7.9%
Andic Cryumbrepts (Med/Lo-SK, M)	6.9%
Lithic Orthents, Andepts, Cryands, and Udands	4.0%
Typic Udivitrands (Pum, M, FRG)	3.9%
Andic Haplumbrepts (Med/Lo, M, FRG)	2.4%
Aquic Vitricryands (Ashy/Med-SK)	1.1%
Vitric Haplocryands (Cind/Med); and Aquolls, Fibrists and Aquods	Less than 1% each

The subwatershed has approximately 49.5 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

Vegetated cover within the subwatershed is composed of 90.3 percent forested woodland, 9 percent recently disturbed or modified land, and less than one percent of the following types: developed/other human use and shrubland and/or grassland.

4.4.16.4 Biological resources

The PHS priority habitat types within the subwatershed include riverine wetland, freshwater forested/shrub wetland, freshwater emergent wetland, snag-rich areas, talus slopes, and herbaceous balds, as well as habitat for elk. The PHS species within the subwatershed include northern spotted owl and northern goshawk. The non-PHS species monitored within the subwatershed include the tailed frog.

Approximately 7.05 stream miles of Wind River summer steelhead are found within the subwatershed. Spawning timing for Wind River summer steelhead is generally from early March through May.

A total of 25.54 acres of NWI wetlands were identified within the subwatershed. These wetlands include 39.5 percent riverine wetland, 39 percent freshwater forested/shrub wetland, and 21.4 percent freshwater emergent wetland.

4.4.16.5 Land Use and Altered Conditions

The only existing land use within this reach is government services, and the reach is entirely publicly owned. In terms of zoning, the watershed is 87.8 percent unzoned and 12.2 percent forest.

The subwatershed has approximately 32.48 miles of roads and a road density of 2.09 miles per square mile. It has approximately 5,461,704 square feet of impervious road surfaces, and no additional square feet of impervious area from structures.

Known archaeological, cultural, or historical resources within the subwatershed include 21 archaeological sites.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Dry Creek

This reach has a total of 3.75 jurisdictional stream miles and 179.38 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are approximately 0.09 miles of roads within the reach. It has approximately 16,999 square feet of impervious road surfaces, and no additional square feet of impervious area from structures. No additional altered conditions are known to be present within this reach.

Big Hollow Creek

This reach has a total of 1.9 jurisdictional stream miles and 92.91 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.4.16.6 Public Access

The subwatershed has 12.72 miles of trails. It is fairly inaccessible from state highways, but access is available from Wind River Road and USFS roads.

4.4.16.7 Restoration Opportunities

Dry Creek has one of the highest percentages of fines and small sediment size classes in the Wind River subbasin and has excessive in-stream sediment levels. High road densities, steep topography, and naturally unstable soils are the primary drivers of sediment impairment. Managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water supply can improve excessive fine sediment and turbidity, embedded substrates, water quality and stream flow. Restoration opportunities include upgrading or removing problem forest roads, reforesting heavily cut areas that are not recovering naturally, reducing watershed imperviousness, and reducing effective stormwater runoff from developed areas such as U.S. Forest Service roads (Washington Forest Protection Association 2005, Lower Columbia Fish Recovery Board 2004).

4.4.17 Trapper Creek – Wind River (170701051004) – Map Sheets 3 and 5a

4.4.17.1 Overview

The Trapper Creek – Wind River HUC (170701051004) is approximately 24,722 total acres in an area with 905 acres of shoreline jurisdictional area, including 15.10 miles of shoreline jurisdiction waterbodies and 15.25 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 45.7987/-121.9038. This subwatershed is largely within the Gifford Pinchot National Forest and includes the portion of Wind River that flows through Stabler.

Wind River (BergerABAM, Inc. 2015)

Trapper Creek (BergerABAM, Inc. 2015)

4.4.17.2 Reaches

Wind River Reach #1: From the confluence of Falls Creek to the confluence of Dry Creek. Its downstream location is 45.8805/-121.9782, and its upstream location is 45.9078/-121.9498. This reach is not a shoreline of statewide significance.

Wind River Reach #2: From the confluence of Dry Creek to the confluence of Trapper Creek. Its downstream location is 45.8794/-121.9806, and its upstream location is 45.8805/-121.9782. This reach is not a shoreline of statewide significance.

Wind River Reach #3: From the confluence of Trapper Creek to the confluence of Cold Creek. Its downstream location is 45.8383/-121.9431, and its upstream location is 45.8794/-121.9806. This reach is not a shoreline of statewide significance.

Wind River Reach #4: From the confluence of Cold Creek to the confluence of Trout Creek. Its downstream location is 45.7987/-121.9038, and its upstream location is 45.8383/-121.9431. This reach is not a shoreline of statewide significance.

Trapper Creek: This reach flows northwest to southeast until its confluence with Wind River. Its downstream location is 45.8794/-121.9806, and its upstream location is 45.9045/-122.0336. This reach is not a shoreline of statewide significance.

Cold Creek: This reach flows west to east until its confluence with Wind River. Its downstream location is 45.8383/-121.9431, and its upstream location is 45.8365/ 121.9504. This reach is not a shoreline of statewide significance.

Unnamed Waterbody: This waterbody is located just north of Cold Creek and west of Wind River. The center of this waterbody is at 45.8399/-121.9527. This reach is not a shoreline of statewide significance.

4.4.17.3 Physical Environment

The subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-79. The subwatershed also includes approximately 133.93 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

Table 4-79. Surficial Geology and Soil Types - Trapper Creek – Wind River (170701051004)

Type	Percent
Surficial Geology	
Volcanoclastic deposits or rocks	47.7%
Basalt flows	19.3%
Tuffs and tuff breccias	12.2%
Alluvium	10%
Basaltic andesite flows	5%
Diorite	2.5%
Volcanoclastic and sedimentary rocks	1.4%
Mass-wasting deposits, mostly landslides; intrusive andesite; andesite flows; alpine glacial drift; gabbro; and intrusive dacite.	Less than 1% each
Soil Types	
Andic haplumbrepts (Med/Lo-SK, M, FRG)	32.8%
Andic haplumbrepts (Med/C, M, FRG)	19.7%
Typic hapludands (Med, M, MES)	15.9%
Stabler loam (0 to 8 % slopes)	5.4%
Lithic orthents, andepts, cryands, and udands	4.3%
Andic haplumbrepts (Med/Lo, M, FRG)	3%
Pillery fine sandy loam	2.3%
Stabler loam (8 to 30 % slopes)	2%
Aschoff very gravelly loam (30 to 65 % slopes)	1.7%
Andic cryumbrepts (Med/Lo-SK, M)	1.7%
Aquic vitricryands (Ashy/Med-SK)	1.7%
Aschoff-rock outcrop complex (30 to 65 %t slopes)	1.1%
Stabbart clay loam	1.1%
St. Martin gravelly silty clay loam (2 to 15 % slopes); Typic udivitrands (Pum, M, FRG); riverwash; Aschoff very gravelly loam (5 to 30 % slopes); Washougal gravelly loam (5 to 30 % slopes); Xerorthents-rock outcrop complex (50 to 90 % slopes); Zygore gravelly loam (5 to 30 % slopes); water; Stabler loam (30 to 65 %t slopes); Typic vitricryands (Ashy/Med-SK); Washougal gravelly loam (2 to 8 % slopes); St. Martin gravelly silty clay loam (30 to 65 % slopes); rock	Less than 1% each

Type	Percent
outcrop-rubbleland complex; and orthents, andepts, and cryands.	

Vegetated cover within the subwatershed is composed of 81.9 percent forested woodland, 17.2 percent recently disturbed or modified land, and less than one percent of each of the following types: developed/other human use, nonvascular or sparse vascular rock vegetation, open water, shrubland and/or grassland. The subwatershed also has a total of 371.69 acres of 100-year FEMA floodplain.

4.4.17.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, riverine wetland, freshwater emergent wetland, freshwater pond, "other" type of wetland, herbaceous bald, snag-rich areas, and talus slopes, as well as habitat for elk, harlequin duck, and mule and black-tailed deer. The PHS species within the subwatershed include northern spotted owl, northern goshawk, fringed myotis, long-legged myotis, Cascade torrent salamander, and great blue heron. The non-PHS species monitored within the subwatershed include the tailed frog and osprey.

Approximately 17.55 stream miles of Wind River summer steelhead, 12.89 stream miles of Wind River spring Chinook, and 8.21 stream miles of Wind River winter steelhead are found within the subwatershed. Spawning timing for the fish are generally as follows: Wind River summer steelhead is from early March through May; Wind River spring Chinook is from early August to mid-September; and Wind River winter steelhead is from December through April.

A total of 401.89 acres of NWI wetlands were identified within the subwatershed. These wetlands include 59.6 percent freshwater forested/shrub wetland, 24.4 percent riverine wetland, 6.4 percent freshwater emergent wetland, 5.3 percent freshwater pond, and 4.4 percent classified as "other."

4.4.17.5 Land Use and Altered Conditions

The existing land use within the subwatershed includes 92.1 percent government services; 4.5 percent residence or accommodation functions; 2.2 percent mining and extraction establishments; and one percent or less of each of the following uses: agriculture, forestry fishing and hunting uses; construction-related business; and transportation, communication, information, and utilities. Approximately 7.6 percent of the subwatershed is privately owned and 92.4 percent is publicly owned. In terms of zoning, the watershed is 91.8 percent unzoned, 7.9 percent residential – higher density, and less than one percent of each of the following types: industrial and commercial.

The subwatershed has approximately 94.75 miles of roads with a road density of 2.45 miles per square mile. It has approximately 401,276 square feet of impervious

surface for structures and 16,376,277 square feet of impervious road surfaces for a total of 16,777,553 square feet of impervious area.

Known archaeological, cultural, or historical resources within the subwatershed include 38 historic properties and 104 archaeological sites.

The subwatershed has 10 wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

There is one dam located within the subwatershed – the Wind River Logging Company Pond, which is located southeast of the confluence of Cold Creek with the Wind River (45.8351/-121.9395).

Wind River Reach #1
This reach has a total of 2.97 jurisdictional stream miles and 141.57 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services. One hundred percent of the reach is publicly owned and is entirely unzoned.

There are approximately 0.94 miles of roads within the reach's shoreline jurisdiction. It has approximately 191,570 square feet of impervious road surfaces, and no additional impervious area of structures. No additional altered conditions are known to be present within this reach.

Wind River Reach #2
This reach has a total of 0.14 jurisdictional stream miles and 6.16 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services. One hundred percent of the reach is publicly owned and is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Wind River Reach #3
This reach has a total of 4.12 jurisdictional stream miles and 283.28 acres of shoreline jurisdictional area. The existing land uses within this reach are 59 percent government services; 40.7 percent residence or accommodation functions; and less than one percent undefined. Approximately 40.7 percent of the reach is privately owned and 59.3 percent is publicly owned. In terms of zoning, the reach is 58 percent residential – higher density, and 42 percent unzoned.

There are approximately 0.54 miles of roads within the reach's shoreline jurisdiction. It has approximately 2,232 square feet of impervious surface for structures and 112,240 square feet of impervious road surfaces for a total of 114,471 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Wind River Reach #4
This reach has a total of 4.12 jurisdictional stream miles and 249.12 acres of shoreline jurisdictional area. The existing land uses within this reach are 49.4 percent residence or accommodation functions; 21.2 percent agriculture, forestry, fishing, and hunting uses; 14.3 percent mining and extraction establishments; 13.6 percent government services; and 1.5 percent undefined. Approximately 85.1 percent of the reach is privately owned and 14.9 percent is publicly owned. In terms of zoning, the reach is 76.2 percent residential – higher density, 14.5 percent unzoned, and 9.3 percent commercial.

There are approximately 0.66 miles of roads within the reach's shoreline jurisdiction. It has approximately 47,089 square feet of impervious surface for structures and 132,933 square feet of impervious road surfaces for a total of 180,022 square feet surfaces. No additional altered conditions are known to be present within this reach.

Trapper Creek
This reach has a total of 3.33 jurisdictional stream miles and 161.73 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services. One hundred percent of the reach is publicly owned and is entirely unzoned.

There are approximately 0.3 miles of roads within the reach's shoreline jurisdiction. It has approximately 11,460 square feet of impervious surface for structures and 47,817 square feet of impervious road surfaces for a total of 59,277 square feet impervious surfaces. No additional altered conditions are known to be present within this reach.

Cold Creek
This reach has a total of 0.41 jurisdictional stream miles and 21.47 acres of shoreline jurisdictional area. The existing land uses within this reach are 71.8 percent residence or accommodation functions; 25.6 percent government services; and 2.7 percent undefined. Approximately 71.8 percent of the reach is privately owned and 28.2 percent is publicly owned. In terms of zoning, the reach is 74.4 percent residential – higher density and 25.6 percent unzoned.

There are approximately 0.2 miles of roads within the reach's shoreline jurisdiction. It has approximately 7,286 square feet of impervious surface for structures and 35,769 square feet of impervious road surfaces for a total of 43,055 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody
This reach has a total of 15.25 acres of shoreline waterbody and 41.68 acres of jurisdictional area. The existing land uses within this reach are 67.9 percent residence

or accommodation functions; 31.6 percent government services, and less than one percent undefined. Approximately 67.9 percent of the reach is privately owned and 32.1 percent is publicly owned. In terms of zoning, the reach is 68.4 percent residential – higher density and 31.6 percent unzoned.

The reach has approximately 0.06 miles of roads and a road density of 0.88 miles per square mile. It has approximately 11,620 square feet of impervious road surfaces, and no additional impervious area for structures. No additional altered conditions are known to be present within this reach.

4.4.17.6 Public Access

The subwatershed has 22.38 miles of trails. The subwatershed is fairly inaccessible from state highways but access is available from Wind River Road that runs parallel to Wind River. Forest service roads and local roads, including Little Soda Springs Road and Mineral Springs Road, also provide access to the subwatershed.

4.4.17.7 Restoration Opportunities

Preventing further degradation of stream channel structure, riparian function, and floodplain function are important components of recovery within this portion of the Wind River. Restoration measures may include the protection of the following components: access to habitats; instream flows through management of water withdrawals; channel structure and stability; water quality; and the natural stream flow regime. Floodplain function and channel migration processes can be restored by setting back, breaching, or removing of artificial confinement structures (Lower Columbia Fish Recovery Board 2004).

4.4.18 Trout Creek (170701051005) – Map Sheet 5

4.4.18.1 Overview

The Trout Creek HUC (170701051005) is approximately 21,705 total acres in size with 183.4 acres of shoreline jurisdictional area, including 1.23 miles of shoreline jurisdiction and 64.71 acres of jurisdictional waterbodies. Using WGS 84, the subwatershed's downstream location is 45.7987/-121.9038, and its upstream location is 45.8024/-121.9262. Most of this subwatershed is located in the south-central portion of the Gifford Pinchot National Forest.

4.4.18.2 Reaches

Trout Creek: This reach begins east of Hemlock Road and flows east until its confluence with the Wind River. Its downstream location is 45.7987/-121.9038, and its upstream location is 45.8024/-121.9262. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #1: This waterbody is located north of the confluence of non-jurisdictional Crater Creek with Trout Creek. The center of this waterbody is at 45.8482/-122.0363. This reach is not a shoreline of statewide significance.

Unnamed Waterbody #2: This waterbody is located northwest of the confluence of non-jurisdictional Layout Creek with Trout Creek. The center of this waterbody is at 45.8302/-122.0336. This reach is not a shoreline of statewide significance.

4.4.18.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-80.

Table 4-80. Surficial Geology and Soil Types - Trout Creek (170701051005)

Type	Percent
Surficial Geology	
Volcanoclastic Deposits or Rocks	27.9%
Basalt Flows	17.9%
Andesite Flows	15.2%
Alluvium	12.2%
Tuffs and Tuff Breccias	11.2%
Volcanic and Sedimentary Rocks	7.1%
Mass-Wasting Deposits, Mostly Landslides	2.8%
Alpine Glacial Drift	2.3%
Basaltic Andesite Flows	1.9%
Glacial Drift, Undivided; Gabbro; Dacite Flows; Diorite; and Intrusive Andesite	1% or less each
Soil Types	
25.7% Andic Haplumbrepts (Med/C, M, FRG)	25.7%
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	18.2%
Andic Haplumbrepts (Med/Lo, M, FRG)	13.8%
Typic Hapludands (med, M, MES)	13.7%
Andic Cryumbreprts (Med/Lo-SK, M)	9.6%
Unclassified	4.0%
Stabler Loam (0 to 8% slopes)	2.8%
Lithic Orthents, Andepts, Cryands, and Udands	2.4%
Zygore Gravelly Loam (30 to 65% slopes)	1.7%
Aschoff Very Gravelly Loam (30 to 65% slopes)	1.6%
Aquolls, Fibrists, and Aquods	1.5%
Stabbart Clay Loam	1.1%
Orthents, Andepts, and Cryands; Aschoff Very Gravelly Loam (5 to 30% slopes); Aschoff-Rock Outcrop Complex (30 to 65% slopes); Stabler Loam (8 to 30% slopes); Washougal Gravelly Loam (8 to 30% slopes); Washougal Gravelly Loam (2 to 8 Percent slopes); Zygore gravelly loam (5 to 30% slopes); Lithic orthents; Pillery Fine Sandy Loam; Zerorthents-Rock Outcrop Complex (50 to 90% slopes); Water; Washougal Gravelly Loam (30 to 50% slopes); Rock Outcrop-Xerorthents Complex (50 to 90% slopes); and Rock Outcrop-Rubbleland Complex	Less than 1% each

The subwatershed has approximately 610.37 acres of landslide hazard zones.

Vegetated cover within the subwatershed is composed of 74.4 percent forested woodland, 24.9 percent recently disturbed or modified land, and less than one percent of each of the following types: agriculture, developed/other human use, and shrubland and/or grassland.

The subwatershed has a total of 14.57 acres of 100-year FEMA floodplain.

4.4.18.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, freshwater emergent wetland, freshwater pond, riverine wetland, herbaceous bald, snag-rich areas, and talus slopes, as well as habitat for elk. The PHS species within the subwatershed include northern spotted owl, northern goshawk, gray wolf, harlequin duck, mountain quail, Larch Mountain salamander, and Cascade Torrent salamander. The non-PHS species monitored within the subwatershed include tailed frog, Cope's giant salamander, and osprey.

Approximately 24.24 stream miles of Wind River summer steelhead, and 1.9 stream miles of Wind River winter steelhead, are found within the subwatershed. Spawning timing for the fish is generally as follows: Wind River summer steelhead is early March through May, and Wind River winter steelhead is from December through April. Until the Hemlock Dam was removed in 2009, it was the primary barrier to fish passage within Trout Creek.

A total of 87.18 acres of NWI wetlands were identified within the subwatershed. These wetlands include 56.8 percent freshwater forested/shrub wetland, 22.9 percent freshwater emergent wetland, 17.3 percent freshwater pond, and 3.1 percent riverine wetland.

4.4.18.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 98.1 government services, and less than one percent of each of the following uses: residence or accommodation functions; mining and extraction establishments; and agriculture, forestry, fishing, and hunting uses. Approximately 1.8 percent of the subwatershed is privately owned and 98.2 percent is publicly owned. In terms of zoning, the watershed is 98.1 percent unzoned and 1.9 percent residential – higher density.

The subwatershed has approximately 113.37 miles of roads and a road density of 3.34 miles per square mile. It has approximately 310,205 square feet of impervious structural surfaces and 18,415,048 square feet of impervious road surfaces, totaling 18,725,253 square feet of impervious areas.

Known archaeological, cultural, or historical resources within the subwatershed includes 33 historic properties, one historic register property, and 47 archaeological sites.

The subwatershed has two wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

The only dam within the subwatershed was the Hemlock Dam, which was removed in 2009. It had been located in Trout Creek at Hemlock Road and Summer Road (45.8022/-121.9327).

Trout Creek

This reach has a total of 1.23 jurisdictional stream miles and 56.42 acres of shoreline jurisdictional area. The existing land uses within this reach are 53.5 percent residence or accommodation functions; 32.7 percent agriculture, forestry, fishing and hunting uses; 9.7 percent government services; 2.5 percent mining and extraction establishments; and 1.6 percent undefined. Approximately 88.6 percent of the reach is privately owned and 11.4 percent is publicly owned. In terms of zoning, the reach is 90.3 percent residential – higher density and 9.7 percent unzoned.

There are approximately 0.26 miles of roads within the reach. It has approximately 23,517 square feet of impervious surface of structures and 43,331 square feet of impervious road surfaces, for a total of 66,848 square feet of impervious areas. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #1

This reach has a total of 48.33 acres of shoreline waterbody and 80.14 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

The reach has approximately 0.45 miles of roads and a road density of 3.59 miles per square mile. It has approximately 70,406 square feet of impervious road surfaces, and no additional impervious area of structures. No additional altered conditions are known to be present within this reach.

Unnamed Waterbody #2

This reach has a total of 16.38 acres of shoreline waterbody and 46.84 acres of jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.4.18.6 Public Access

The subwatershed has 8.69 miles of trails. It is fairly inaccessible from state highways but access is available from USFS roads and local roads, including Hemlock Road.

4.4.18.7 Restoration Opportunities

The removal of the Hemlock Dam in 2009 constituted a major restoration of Trout Creek; the project included the removal of over 100,000-cy of impounded sediment and the placement of large woody debris in the floodplain and channel. Additional restoration opportunities include managing forest practices and growth and development to minimize impacts to sediment supply processes, runoff regime, and water quality (Lower Columbia Fish Recovery Board 2004).

4.4.19 Panther Creek (170701051006) – Map Sheets 4, 5a, 5d, 6, and 6b

4.4.19.1 Overview

The Panther Creek HUC (170701051006) is approximately 26,529 total acres in an area with 13.80 miles of shoreline jurisdictional area and 669.65 acres of shoreline jurisdiction waterbodies. Using WGS 84, the subwatershed's downstream location is 45.7610/-121.8314. The Panther Creek subwatershed is located on the west side of the Cascade Range crest in the south-central portion of Skamania County. The subwatershed is largely within the Gifford Pinchot National Forest.

Panther Creek and Panther Creek Falls (Skamania County 2015a)

4.4.19.2 Reaches

Panther Creek Reach #1: The upper reach of Panther Creek includes Panther Creek Falls until the confluence of Mouse Creek. Its downstream location is 45.8427/-121.8600, and its upstream location is 45.8824/-121.8127. This reach is not a shoreline of statewide significance.

Panther Creek Reach #2: From the confluence of Mouse Creek to the confluence of the Eightmile Creek. Its downstream location is 45.8393/-121.8689, and its upstream location is 45.8427/-121.8600. This reach is not a shoreline of statewide significance.

Panther Creek Reach #3: From the confluence of Eightmile Creek to the confluence of Cedar Creek. Its downstream location is 45.7969/-121.8630, and its upstream location is 45.8393/-121.8689. This reach is not a shoreline of statewide significance.

Panther Creek Reach #4: From the confluence of Cedar Creek to its confluence with Wind River. Its downstream location is 45.7610/-121.8314, and its upstream location is 45.7969/-121.8630. This reach is not a shoreline of statewide significance.

Cedar Creek: This portion of Cedar Creek flows in the general northeast to southwest direction until its confluence with Panther Creek. Its downstream location is 45.7969/-121.8630, and its upstream location is 45.8105/-121.8512. This reach is not a shoreline of statewide significance.

Eightmile Creek: This reach includes the lower portion of Eightmile Creek until its confluence with Panther Creek. Its downstream location is 45.8393/-121.8689, and its upstream location is 45.8421/-121.8736. This reach is not a shoreline of statewide significance.

Mouse Creek: This reach includes the lower portion of Mouse Creek until its confluence with Panther Creek. Its downstream location is 45.8427/-121.8600, and its upstream location is 45.8391/-121.8540. This reach is not a shoreline of statewide significance.

4.4.19.3 Physical Environment

The subwatershed's surficial geology (i.e., lithology) and soil types are listed in Table 4-81.

Table 4-81. Surficial Geology and Soil Types - Panther Creek (170701051006)

Type	Percent
Surficial Geology	
Basalt flows	10.2%
Andesite flows	8.5%
Mass-wasting deposits, mostly landslides	4.3%
Basaltic andesite flows	2.1%
Tuffs and tuff breccias	2.1%
Alpine glacial till	2%
Alluvium	1.4%
Diorite, Alluvial fans and talus, Water	Less than 1% each
Soil Types	
Andic haplumbrepts (Med/Lo-SK, M, FRG)	47.8%
Andic haplumbrepts (Med/C, M, FRG)	17.9%
Typic udivitrands (Pum, M, FRG)	6.7%
St. Martin gravelly silty clay loam (30 to 65 % slopes)	4.5%
Typic Vitricryands (Pum)	4.2%
Lithic orthents, andepts, cryands, and udands	2.7%
Typic vitricryands (Pum, M)	2.4%
Stabler loam (0 to 8 % slopes)	2.1%
Andic Cryumbrepts (Med/Lo-SK, M)	2.1%
Aquic hapludolls (fine, Mont, M, MES)	1.8%
Andic haplumbrepts (Med/Lo, M, FRG)	1.8%
Zygore gravelly loam (30 to 65 % slopes)	1.2%
Typic vitricryands (Ashy/Med-SK); Typic hapludands (Med, M, FRG); orthents, andepts, and cryands; St. Martin gravelly silty clay loam (2 to 15 %t); St. Martin gravelly silty clay loam (15 to 30 % slopes); rock outcrop-xerorthents complex (50 to 90 % slopes); Pillery fine sandy loam; Stabler loam (30 to 65 % slopes); Aschoff-rock outcrop complex (30 to 65 % slopes); Zygore gravelly loam (5 to 30 % slopes); riverwash; Stabbart clay loam; aquolls, fibrists, and aquods; and Aquic vitricryands (Ashy/Med-SK)	Less than 1% each

Vegetated cover within the subwatershed is composed of 74.9 percent forested woodland, 24.3 percent recently disturbed or modified land, and less than one percent of each of the following types: developed/other human use, nonvascular or sparse vascular rock vegetation, shrubland and/or grassland. The subwatershed has a total of 17 acres of 100-year FEMA floodplain. It also contains approximately 1,142.78 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

4.4.19.4 Biological Resources

The PHS priority habitat types within the subwatershed include freshwater forested/shrub wetland, riverine wetland, freshwater emergent wetland, "other" type of wetland, freshwater pond, herbaceous bald, cave or cave-rich areas, and talus slopes, as well as habitat for elk and mule and black-tailed deer. The PHS species within the subwatershed include northern spotted owl, Northern goshawk, Townsend's big-eared bat, Larch Mountain salamander, and Cascade torrent salamander. The non-PHS species monitored within the subwatershed include the tailed frog.

Approximately 20.32 stream miles of Wind River summer steelhead are found within the subwatershed. Spawning timing for the Wind River summer steelhead are generally from early March through May. The Panther Creek canyon reaches are important habitats for summer steelhead juvenile rearing as they have been relatively protected from riparian impacts due to the steepness of the canyons and lack of near-stream roadways.

A total of 76.13 acres of NWI wetlands were identified within the subwatershed. These wetlands include 64.4 percent freshwater forested/shrub wetland, 24.8 percent riverine wetland, 4.5 percent freshwater emergent wetland, 3.5 percent classified as "other," and 2.8 percent freshwater pond.

4.4.19.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 94.9 percent government services; 2.4 percent mining and extraction establishments; 2.1 percent residence or accommodation functions; and less than one percent of each of the following types: agriculture, forestry, fishing, and hunting uses; manufacturing and wholesale trade; transportation, communication, information, and utilities; and undefined use. Approximately 4.9 percent of the subwatershed is privately owned and 95.1 percent is publicly owned. In terms of zoning, the watershed is 94 percent unzoned; 4.1 percent residential – higher density; 1.8 percent forest; and less than 1 percent of each of the following types: industrial and commercial.

The subwatershed has approximately 120.4 miles of roads with a road density of 2.9 miles per square mile. The subwatershed has approximately 254,139 square feet

of impervious structural surfaces and 20,706,453 square feet of impervious road surfaces for a total of 20,906,592 square feet of impervious surfaces.

Known archaeological, cultural, or historical resources within the subwatershed include one historic property, 51 archaeological sites, and one cemetery.

The subwatershed has four wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

Panther Creek Reach #1
This reach has a total of 4 jurisdictional stream miles and 193.61 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.96 miles of roads within the reach's shoreline jurisdiction. It has approximately 196,806 square feet of impervious road surfaces, and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Panther Creek Reach #2
This reach has a total of 0.6 jurisdictional stream miles and 31.39 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.23 miles of roads within the reach's shoreline jurisdiction. It has approximately 41,960 square feet of impervious road surfaces, and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Panther Creek Reach #3
This reach has a total of 3.73 jurisdictional stream miles and 180.70 acres of shoreline jurisdictional area. The existing land uses within this reach are 81.2 percent government services 8.9 percent residence or accommodation functions; 7.3 percent mining and extraction establishments; 1.8 percent agriculture, forestry, fishing, and hunting uses; and less than one percent undefined use. Approximately 18 percent of the reach is privately owned and 82 percent is publicly owned. In terms of zoning, the reach is 81.2 percent unzoned and 18.8 percent residential – higher density. There are approximately 0.6 miles of roads within the reach's shoreline jurisdiction. It has approximately 3,879 square feet of impervious structural surfaces and 115,951 square feet of impervious road surfaces for a total of 119,830 square feet of impervious surfaces. This reach has a wellhead protection area. No additional altered conditions are known to be present within this reach.

Panther Creek Reach #4

This reach has a total of 3.52 jurisdictional stream miles and 168.33 acres of shoreline jurisdictional area. The existing land uses within this reach are 52.8 percent residence or accommodation functions; 19.8 percent mining and extraction establishments; 16.1 percent government services; 9.1 percent agriculture, forestry, fishing, and hunting uses; and 2.2 percent undefined. Approximately 81.7 percent of the reach is privately owned and 18.3 percent is publicly owned. In terms of zoning, the reach is 83.8 percent residential – higher density, 10.4 percent unzoned, and 5.7 percent forest. There are approximately 0.78 miles of roads within the reach's shoreline jurisdiction. It has approximately 10,583 square feet of impervious structural surfaces and 159,935 square feet of impervious road surfaces for a total of 170,518 square feet of impervious area surfaces. No additional altered conditions are known to be present within this reach.

Cedar Creek

This reach has a total of 1.17 jurisdictional stream miles and 57.19 acres of shoreline jurisdictional area. The existing land uses within this reach are 65.9 percent government services; 31.5 percent agriculture, forestry, fishing, and hunting uses; and less than one percent of each of the following uses: mining and extraction establishments; and undefined use. Approximately 33.1 percent of the reach is privately owned and 66.9 percent is publicly owned. In terms of zoning, the reach is 67.4 percent unzoned and 32.6 residential – higher density. There are approximately 0.16 miles of roads within the reach's shoreline jurisdiction. It has approximately 7,560 square feet of impervious structural surfaces and 25,068 square feet of impervious road surfaces for a total of 32,628 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Eightmile Creek

This reach has a total of 0.34 jurisdictional stream miles and 16.97 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or structural surface within this reach's shoreline jurisdiction. No additional altered conditions are known to be present within this reach.

Mouse Creek

This reach has a total of 0.43 jurisdictional stream miles and 21.46 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services. All of the reach is publicly owned and it is entirely unzoned. There are approximately 0.07 miles of roads within the reach's shoreline jurisdiction. It has approximately 14,582 square feet of impervious road surfaces, and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

4.4.19.6 Public Access

The subwatershed has 14.03 miles of trails. The subwatershed is fairly accessible from Wind River Highway and local roads including Panther Creek Road that runs parallel to Panther Creek.

4.4.19.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition. The protection of the Panther Creek stream corridor structure and function is a priority to maintain productive juvenile steelhead rearing habitat. Restoration opportunities include the protection of the following measures: riparian function and access to habitats; instream flows through management of water withdrawals; channel structure and stability; water quality; natural stream flow regime; and floodplain function and channel migration processes (Lower Columbia Fish Recovery Board 2004).

4.4.20 Bear Creek (170701051007) – Map Sheets 6 and 6b

4.4.20.1 Overview

The Bear Creek HUC (170701051007) is approximately 9,505 total acres in an area with 225.81 acres of shoreline jurisdictional area and 4.67 miles of shoreline jurisdiction. Using WGS 84, the subwatershed's downstream location is 45.7613/ 121.8314. This subwatershed is located in the southeast quadrant of Skamania County and along the west side of the Cascade Range crest. Most of the subwatershed is within the Gifford Pinchot National Forest.

4.4.20.2 Reaches

Bear Creek (Reach #1): The upper reach of Bear Creek flows in a generally north to south direction until the confluence of the Bear Creek unnamed tributary. Its downstream location is 45.7875/-121.7985, and its upstream location is 45.7996/ 121.79656. This reach is not a shoreline of statewide significance.

Bear Creek (Reach #2): From the confluence of the Bear Creek unnamed tributary until its confluence with the Wind River. Its downstream location is 45.7613/-121.8314, and its upstream location is 45.7875/-121.7985. This reach is not a shoreline of statewide significance.

Bear Creek, UT: This unnamed tributary flows from southeast to northwest until its confluence with Bear Creek. Its downstream location is 45.7875/-121.7985, and its upstream location is 45.7826/-121.7846. This reach is not a shoreline of statewide significance.

4.4.20.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in

Table 4-82.

Table 4-82. Surficial Geology and Soil Types - Bear Creek (170701051007)

Type	Percent
Surficial Geology	
Volcanoclastic Deposits or Rocks	96.5%
Basalt Flows	2.2%
Basaltic Andesite Flows, Alluvium, and Alluvium including Alluvial Fans and Talus	Less than 1% each
Soil Types	
Andic Haplumbrepts (Med/Lo-SK, M, FRG)	60.5%
Andic Haplumbrepts (Med/C, M, FRG)	24.3%
Lithic Orthents, Andepts, Cryands, And Udands	6.4%
St. Martin Gravelly Silty Clay Loam (30 to 65% slopes)	5.0%
Andic Cryumbrepts (Med/Lo-SK, M)	2.0%
Aquic Hapludolls (fine, Mont, M, Mes); Stabler Loam (0 to 8% slopes); Typic Hapludands (Med, M, MES); Rock Outcrop-Xerorthents Complex (50 to 90% slopes); Riverwash; and Typic Udivitrands (Pum, M, FRG)	Less than 1% each

Vegetated cover within the subwatershed is composed of 86.6 percent forested woodland, 12.7 percent recently disturbed or modified land, and less than one percent of each of the following types: agriculture, developed/other human use, and shrubland and/or grassland.

The subwatershed has a total of 12.92 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.4.20.4 Biological Resources

The PHS priority habitat types within the subwatershed include riverine wetland, herbaceous bald, and talus slopes, as well as habitat for elk, mule deer, and black-tailed deer. The PHS species within the subwatershed include northern spotted owl, Larch Mountain salamander, and sharptail snake. In addition, a total of 1.59 acres of NWI wetlands were identified within the subwatershed and are classified as riverine wetland.

4.4.20.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 95.9 percent government services; 2.7 percent mining and extraction establishments; and less than one percent of each of the following types: residence or accommodation functions; agriculture, forestry, fishing, and hunting uses; and undefined use. Approximately 4.1 percent of the subwatershed is privately owned, and 95.9 percent is publicly owned. In terms of zoning, the watershed is 92.5 percent unzoned, 6.3 percent forest, and one percent or less of each of the following types: residential – higher density, and open space/conservancy.

The subwatershed has approximately 28.93 miles of roads and a road density of 1.95 miles per square mile. It has approximately 35,268 square feet of impervious

structural surfaces and 5,114,234 square feet of impervious road surfaces for a total of 5,149,502 square feet of impervious areas.

There is one known archaeological resources within the subwatershed.

No wellhead protection areas or utility infrastructure are known to be present and no State 303d water quality issues have been identified within this subwatershed.

Bear Creek (Reach #1)
This reach has a total of 0.94 jurisdictional stream miles and 45.89 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned.

There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Bear Creek (Reach #2)
This reach has a total of 2.8 jurisdictional stream miles and 134.3 acres of shoreline jurisdictional area. The existing land uses within this reach are 54.2 percent services – government; 20.8 percent mining and extraction establishments; 18.5 percent residence or accommodation functions; and 6.4 percent agriculture, forestry, fishing, and hunting uses. Approximately 45.7 percent of the reach is privately owned and 54.3 percent is publicly owned. In terms of zoning, the reach is 66.7 percent unzoned, 17.6 percent forest, and 15.8 percent residential – higher density.

There are approximately 1.32 miles of roads within the reach. It has approximately 9,864 square feet of impervious structural surfaces and 260,904 square feet of impervious road surfaces for a total of 270,767 square feet of impervious areas. No additional altered conditions are known to be present within this reach.

Bear Creek, UT
This reach has a total of 0.93 jurisdictional stream miles and 45.61 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or structural surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.4.20.6 Public access
The subwatershed has 2.5 miles of trails. It is fairly inaccessible from state highways but there is access from USFS roads and from Bear Creek Road, which runs parallel to Bear Creek.

4.4.20.7 Restoration Opportunities
Ecological conditions within this subwatershed are generally in good condition. Hydrologic conditions for the Bear Creek drainage are predicted to remain stable

over the next decade based on the high proportion of public lands, relatively low road density, and high proportion of mature vegetation. The stream corridor structure and function can be preserved by protecting riparian function and access to habitats; instream flows through management of water withdrawals; channel structure and stability; water quality; natural stream flow regime; and floodplain function and channel migration processes (Lower Columbia Fish Recovery Board 2004).

4.4.21 Little Wind River – Wind River (170701051008) – Map Sheet 6b

4.4.21.1 Overview

The Little Wind River – Wind River HUC (170701051008) is approximately 17,164 total acres in an area with 738.28 acres of shoreline jurisdictional area and 14.04 miles of shoreline jurisdiction waterbodies. Using the World Geodetic System 1985 (WGS 84), the subwatershed's downstream location is 45.7156/-121.7920, and its upstream location is 45.7987/-121.9038. This subwatershed is located within the southeast quadrant of Skamania County and along the west side of the Cascade Range crest. The subwatershed includes portions of Carson and Home Valley, and a small portion borders the Columbia River at the confluence of the Wind River.

Wind River Confluence with Columbia River – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

4.4.21.2 Reaches

Little Wind River: This reach flows northeast to southwest until its confluence with Wind River. Its downstream location is 45.7273/-121.7945, and its upstream location is 45.7539/-121.7600. This reach is not a shoreline of statewide significance.

Wind River (Reach #5): From the confluence of Trout Creek to the confluence of Panther Creek. Its downstream location is 45.7610/-121.8314, and its upstream location is 45.7987/-121.9038. This reach is not a shoreline of statewide significance.

Wind River (Reach #6): From the confluence of Panther Creek to the confluence of Little Wind River. Its downstream location is 45.7273/-121.7945, and its upstream location is 45.7610/-121.8314. This reach is a shoreline of statewide significance.

Wind River (Reach #7): From the confluence of Little Wind River to its confluence with the Columbia River, where SR 14 crosses the Wind River. Its downstream location is 45.7156/-121.7920, and its upstream location is 45.7273/-121.7945. This reach is a shoreline of statewide significance.

4.4.21.3 Physical Environment

Information about the surficial geology (i.e., lithology) and soil types in the subwatershed is listed in Table 4-83.

Table 4-83. Surficial Geology and Soil Types - Little Wind River – Wind River (170701051008)

Type	Percent
Surficial Geology	
Volcanoclastic Deposits or Rocks	32.1%
Basalt Flows	16.9%
Mass-Wasting Deposits, Mostly Landslides	15.2%
Volcanic and Sedimentary Rocks	11.6%
Tuffs and Tuff Breccias	5.8%
Andesite Flows	5.7%
Alluvium	3.9%
Diorite	2.0%
Basalt Flows	1.9%
Intrusive Dacite	1.6%
Alluvium, Older (includes Alluvial Fans And Talus)	1.3%
Basaltic Andesite Flows, Terraced Deposits, Water, Gabbro, Alluvium, and Andesite Flows	Less than 1% each
Soils	
St. Martin Gravelly Silty Clay Loam, 30 to 65% slopes	32.8%
Andic Haplumbrepts, MED/LO-SK, M, FRG	16.5%
Stabler Loam, 0 to 8% slopes	5.6%
Undusk Gravelly Loam, 30 to 65% slopes	4.5%
St. Martin Gravelly Silty Clay Loam, 15 to 30% slopes	4.1%
Aschoff Very Gravelly Loam, 30 to 65% slopes	3.8%
Zygore Gravelly Loam, 30 to 65% slopes	3.1%
Skamania Very Fine Sandy Loam, 0 to 8% slopes	3.0%
Washougal Gravelly Loam, 2 to 8% slopes	2.9%
St. Martin Gravelly Silty Clay Loam, 2 to 15% slopes	2.7%
Aschoff Very Gravelly Loam, 5 to 30% slopes	2.5%
Xerorthents-Rock Outcrop Complex, 50 to 90% slopes	2.5%

Type	Percent
Undusk Gravelly Loam, 5 to 30% slopes	1.8%
Washougal Gravelly Loam, 30 to 50% slopes	1.7%
Andic Haplumbrepts, MED/C, M, FRG	1.7%
Stabler Loam, 8 to 30% slopes	1.5%
Water	1.2%
Stabbart Clay Loam; Rock Outcrop-Rubbleland Complex; Underwood Loam, 15 to 30% slopes; Lithic Orthents, Andepts, Cryands, Udands; Rock Outcrop-Xerorthents Complex, 50 to 90% slopes; Aschoff-Rock Outcrop Complex, 30 to 65% slopes; Chemawa Loam, 8 to 15% slopes; Chemawa Loam, 15 to 30% slopes; Underwood Loam, 30 to 50% slopes; Steever-Rock Outcrop Complex, 30 to 65% slopes; Stabler Loam, 30 to 65% slopes; Mcelroy Gravelly Loam, 30 to 65% slopes; Steever Stony Clay Loam, 30 to 65% slopes; Aquic Hapludolls, FINE, MONT, M, MES; Mountzion Clay Loam, 30 to 65% slopes; Washougal Gravelly Loam, 8 to 30% slopes; Skamania Very Fine Sandy Loam, 8 to 15% slopes; Zygore Gravelly Loam, 5 to 30% slopes; Skamania Very Fine Sandy Loam, 15 to 30% slopes; Pilchuck Very Fine Sandy Loam; Mountzion Clay Loam, 15 to 30% slopes; Not Classified; Bonneville Stony Sandy Loam; Aquolls, Fibrists, Aquods	Less than 1% each

Vegetated cover within the subwatershed is composed of 76.6 percent forested woodland, 21.5 percent recently disturbed or modified land, 2.2 percent agriculture, 1.7 percent developed/other human use, and less than one percent of each of the following types: nonvascular or sparse vascular rock vegetation, open water, and shrubland and/or grassland.

The subwatershed also has approximately 2,611.67 acres of landslide hazard zones and a total of 661.11 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.4.21.4 Biological Resources

The PHS priority habitat types within the subwatershed include lake, riverine wetland, freshwater forested/shrub wetland, freshwater emergent wetland, freshwater pond, herbaceous bald, cliffs/bluffs, and talus slopes, as well as habitat for elk, mule deer, and black-tailed deer. The PHS species within the subwatershed include northern spotted owl, Larch mountain salamander, and purple martin. The non-PHS species monitored within the subwatershed include osprey.

Approximately 18.28 stream miles of Wind River winter steelhead, 14.15 stream miles of Wind River summer steelhead, 10.97 miles of Wind River spring Chinook, and 2.22 miles of Wind River bright fall Chinook and Wind River tule fall Chinook are found within the subwatershed. Shipherd Falls at Wind River RM 2 historically blocked all anadromous fish, except for steelhead, until a fish ladder was constructed in the 1950s. Spawning timing for fish is generally as follows: Wind River winter steelhead, early March to early June; Wind River spring Chinook, early August to

mid-September; Wind River bright fall Chinook, late October through November; and Wind River tule fall Chinook, September.

A total of 154.57 acres of NWI wetlands were identified within the subwatershed. These wetlands include 49.4 percent lake, 32.5 percent riverine wetland, 6.4 percent freshwater forested/shrub wetland, 6.2 percent freshwater emergent wetland, and 5.5 percent freshwater pond.

4.4.21.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 63.9 percent government services, 15.5 percent mining and extraction establishments; 9 percent residence or accommodation functions; 7.8 percent agriculture, forestry, fishing and hunting uses; 1.4 percent undefined; 1.3 percent construction-related business; and one percent or less of each of the following types: general sales or services; transportation, communication, information and utilities; and arts, entertainment, and recreation. Approximately 34.4 percent of the subwatershed is privately owned and 65.6 percent is publicly owned. In terms of zoning, the watershed is 35.4 percent forest, 26.5 unzoned, 19.7 percent open space/conservancy, 11.8 percent residential – higher density, 3.9 percent residential – lower density, 1.8 percent commercial, and less than one percent of each of the following: industrial, water, and public recreation.

The subwatershed has approximately 97.81 miles of roads and a road density of 3.2 miles per square mile. It has approximately 2,293,750 square feet of impervious surface for structures and 15,834,477 square feet of impervious road surfaces for a total of 18,128,227 square feet of impervious area. The subwatershed has one bridge on SR 14 over the Wind River; data for bridges on County or other roads was not available.

Known archaeological, cultural, or historical resources within the subwatershed include one historic property, four archaeological sites, eight cemeteries, and one historic register polygon.

The subwatershed has eight wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed. There is one state cleanup site listing within the watershed.

There is one dam within the subwatershed – the Berge Reservoir Dam, which is located north of Home Valley and south of the Little Wind River (45.7329/-121.7554).

Little Wind River

This reach has a total of 2.98 jurisdictional stream miles and 143.93 acres of shoreline jurisdictional area. The existing land uses within this reach are 73.3 percent government services, 11.6 percent mining and extraction establishments; 7.5 percent transportation, communication, information, and utilities; 4 percent residence or accommodation functions; and 3.7 percent agriculture, forestry, fishing and hunting

uses. Approximately 19.3 percent of the reach is privately owned and 80.7 percent is publicly owned. In terms of zoning, the reach is 90.7 percent forest, 7.9 percent commercial, and 1.4 percent open space/conservancy.

There are approximately 0.11 miles of roads within the reach. It has approximately 17,611 square feet of impervious road surfaces, and no additional impervious area of structures. No additional altered conditions are known to be present within this reach.

Wind River (Reach #5)
This reach has a total of 6.44 jurisdictional stream miles and 311.21 acres of shoreline jurisdictional area. The existing land use within this reach is 38.2 percent mining and extraction establishments; 31.9 percent agriculture, forestry, fishing, and hunting uses; 23.9 percent government services; 5.3 percent residence or accommodation functions; and less than one percent undefined use. Approximately 75.3 percent of the reach is privately owned and 24.7 percent is publicly owned. In terms of zoning, the reach is 45.3 percent unzoned, 44.4 percent residential – high density, 6.5 percent forest, and 3.8 percent residential – lower density.

There are approximately 0.20 miles of roads within the reach's shoreline jurisdiction. The reach has approximately 550 square feet of impervious surface for structures and 37,078 square feet of impervious road surfaces for a total of 37,627 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Wind River (Reach #6)
This reach has a total of 3.3 jurisdictional stream miles and 158.89 acres of shoreline jurisdictional area. The existing land uses within this reach are 45.8 percent government services; 20.2 percent agriculture, forestry, fishing and hunting uses; 15.4 percent mining and extraction establishments; 12.5 percent construction-related business; 6 percent residence or accommodation functions; and less than one percent general sales or services. Approximately 54.2 percent of the reach is privately owned and 45.8 percent is publicly owned. In terms of zoning, the reach is 69.5 percent open space/conservancy, 9.2 percent residential – lower density; 8 percent unzoned, 7.6 percent forest, 5.5 percent commercial, and less than one percent industrial and residential – higher density.

It has approximately 517 square feet of impervious surface for structures, and no square feet of impervious road surfaces. This reach has two wellhead protection areas. No additional altered conditions are known to be present within this reach.

Wind River (Reach #7)
This reach has a total of 1.32 jurisdictional stream miles and 124.25 acres of shoreline jurisdictional area. The existing land uses within this reach are 32.3 percent general

sales or services; 25 percent undefined use; 17 percent agriculture, forestry, fishing and hunting uses; 15.6 percent residence or accommodation functions; 8.7 percent government services; and 1.5 percent mining and extraction establishments. Approximately 53.1 percent of the reach is privately owned and 46.9 percent is publicly owned. In terms of zoning, the reach is 35.1 percent water, 28.5 percent open space/conservancy, 15.3 percent commercial, 9 percent public recreation, 6.9 percent residential – lower density, 3.3 percent residential – higher density, and 1.9 percent forest. There is a utility line crossing at Indian Cabin Road.

There are approximately 1.61 miles of roads within the reach's shoreline jurisdiction. The reach has approximately 8,998 square feet of impervious surface for structures and 300,216 square feet of impervious road surfaces for a total of 309,214 square feet of impervious areas. No additional altered conditions are known to be present within this reach.

4.4.21.6 Public Access

The subwatershed has 1.15 miles of trails. There is one boat ramp (Wind River Boat Ramp) and one golf course (Carson Mineral Hot Springs Golf Course). The subwatershed is accessible from SR 14 and number of local roads and USFS roads.

4.4.21.7 Restoration Opportunities

Ecological conditions within this subwatershed are generally in good condition. The stream corridor structure and function of the Little Wind River and lower Wind River can be preserved by protecting: riparian function and access to habitats; instream flows by managing water withdrawals; channel structure and stability; water quality; natural stream flow regime; and floodplain function and channel migration processes. Hillslope runoff and sediment delivery processes on forest and developed lands – in particular, the Carson Golf Course – within the lower mainstem of Wind River have caused severe erosion and created excessive fine sediment and turbidity. Restoration opportunities include reducing effective stormwater runoff from these areas (Lower Columbia Fish Recovery Board 2004).

4.4.22 Grays Creek – Columbia River (170701051106) – Map Sheets 6b and 6c

4.4.22.1 Overview

The Grays Creek – Columbia River HUC (170701051106) is approximately 15,316.9 total acres in an area with 3317.8 acres of shoreline jurisdictional area and 13.55 miles of shoreline jurisdiction waterbodies. Using the WGS 84, the subwatershed's downstream location is 45.7042/-121.7932, and its upstream location is 45.7250/-121.5224. This subwatershed is located in the southwest quadrant of Skamania County and includes portions of the community of Home Valley. The HUC includes reaches of the Columbia River from the confluence of the White Salmon River to the confluence of the Wind River.

Columbia River Shoreline downstream of Little White Salmon River (BergerABAM, Inc. 2015)

4.4.22.2 Reaches

Columbia River Reach #1: From the confluence of the White Salmon River to the Spring Creek Hatchery. Its downstream location is 45.7253/-121.5399, and its upstream location is 45.7250/-121.5224. This reach is a shoreline of statewide significance.

Columbia River Reach #2: From the Spring Creek Hatchery to just upstream of Ruthton Point. Its downstream location is 45.7186/-121.5705, and its upstream location is 45.7253/-121.5399. This reach is a shoreline of statewide significance.

Columbia River Reach #3: This reach begins just upstream of Ruthton Point and continues until the confluence of the Little White Salmon River at Drano Lake. Its downstream location is 45.7053/-121.6482, and its upstream location is 45.7186/-121.5705. This reach is a shoreline of statewide significance.

Columbia River Reach #4: This reach begins at the confluence of the Little White Salmon River at Drano Lake and extends downstream to the upstream extent of Home Valley Park. Its downstream location is 45.7001/-121.7685, and its upstream location is 45.7053/-121.6482. This reach is a shoreline of statewide significance.

Columbia River Reach #5: This reach begins just upstream of Home Valley Park and continues until the confluence of Wind River. Its downstream location is

45.7042/-121.7932, and its upstream location is 45.7001/-121.7685. This reach is a shoreline of statewide significance.

4.4.22.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is listed in Table 4-84. The subwatershed has also includes approximately 3,388.06 acres of landslide hazard zones. See Map 5 for pCMZs within this subwatershed.

Table 4-84. Surficial Geology and Soil Types - Grays Creek – Columbia River (170701051106)

Type	Percent
Surficial Geology	
Basalt flows	50.6%
Mass-wasting deposits, mostly landslides	22.1%
Water	18.1%
Quartz diorite	3.5%
Alluvium	1.6%
Terraced deposits	1.1%
Gabbro	1.1%
Intrusive dacite, Volcanoclastic deposits or rocks, Artificial fill, including modified land, Continental sedimentary deposits or rocks	Less than one %
Soil	
Water	19.6%
St. Martin gravelly silty clay loam, slumped, 2 to 30 % slopes	11.6%
McElroy gravelly loam, 30 to 65 % slopes	9.4%
Rock outcrop-Rubbleland complex	8.7%
Xerorthents-Rock outcrop complex, 50 to 90 % slopes	6.4%
Not classified	4.6%
Rock outcrop-Xerorthents complex, 50 to 90 % slopes	4.5%
Chemawa loam, 15 to 30 % slopes	4.5%
Andic haplumbrepts, MED/LO-SK, M, FRG	3.8%
Undusk gravelly loam, 30 to 65 % slopes	3.7%
Chemawa loam, 8 to 15 % slopes	2.3%
Typic udivitrands, PUM, M, FRG	2.3%
Chemawa loam, 2 to 8 % slopes	2.2%
St. Martin gravelly silty clay loam, 15 to 30 % slopes	2.1%
Lithic orthents, andepts, cryands, udands	2.1%
Underwood loam, 15 to 30 % slopes	1.9%
McElroy gravelly loam, 15 to 30 % slopes	1.5%
McElroy very stony loam, 5 to 15 % slopes	1.4%
Undusk gravelly loam, 5 to 30 % slopes	1.2%
Skamania very fine sandy loam, 15 to 30 % slopes	1.1%
Pilchuck very fine sandy loam; Underwood loam, 30 to 50 % slopes; Andic haplumbrepts, MED/LO, M, FRG; Skamania very fine sandy loam, 0 to 8 % slopes; Andic haplumbrepts, MED/C, M, FRG; Chemawa loam, 30 to 50 % slopes; Timberhead gravelly loam, 5 to 30 % slopes; McElroy gravelly loam, 5 to 15 % slopes; Aquic hapludolls, fine, MONT, M, MES; St. Martin gravelly silty clay loam, 2 to 15 % slopes; Pits; Underwood loam, 2 to 15 % slopes; Washougal gravelly loam, 2 to 8 % slopes; Riverwash; Lithic	Less than one %

Type	Percent
orthents; St. Martin gravelly silty clay loam, 30 to 65 % slopes; Aquolls, fibrists, aquods	

Vegetated cover within the subwatershed is composed of 56.3 percent forested woodland, 19.1 percent open water, 9.8 percent recently disturbed or modified land, 6.1 percent agriculture, 3 percent developed/other human use, 3.4 percent nonvascular or sparse vascular rock vegetation, 2 percent shrubland and/or grassland, and less than one percent semi-desert. The subwatershed has a total of 2,830.56 acres of 100-year FEMA floodplain.

4.4.22.4 Biological Resources

The PHS priority habitat types within the subwatershed include lake, freshwater pond, freshwater emergent wetland, freshwater forested shrub wetland, cliffs/bluffs, herbaceous balds, talus slopes, as well as suitable habitat for elk, Larch mountain salamander, waterfowl, and Columbia black-tailed and mule deer. The PHS species within the subwatershed include northern spotted owl, bald eagles, Pacific pond turtle, peregrine falcon, California mountain kingsnake, Larch mountain salamander, purple martin, and western gray squirrel. The non-PHS species monitored within the subwatershed include ringneck snake, Cope's giant salamander, Southern alligator lizard, osprey and sand roller.

Approximately 13.5 stream miles of Hanford Reach fall Chinook, 0.59 stream miles of White Salmon River winter steelhead, and 0.15 stream miles of White Salmon River summer steelhead, White Salmon River tule fall Chinook, and White Salmon River bright fall Chinook are found within the subwatershed. Summer-run steelhead re-enter freshwater between May and October and require several months to mature before spawning, generally late February and early April. Winter-run steelhead re-enter freshwater between December and May as sexually mature fish and peak spawning occurs in late April and early May. Tule fall Chinook enter freshwater from August to September and spawn late September to November. The bright fall Chinook generally return later than tule fall Chinook, are less mature when they enter the Columbia River, and spawn later in the year, typically from November to January (NOAA Fisheries 2013a).

A total of 3,001 acres of NWI wetlands were identified within the subwatershed. These wetlands include 98.3 percent lake (e.g., including Lake Bonneville), 1.4 percent freshwater pond, and less than one percent of each of the following types: freshwater emergent wetland and freshwater forested shrub wetland.

4.4.22.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 50.9 percent government services; 18.9 percent undefined; 9.5 percent mining and extraction establishments; 9 percent residence or accommodation functions; 7.5 percent agriculture, forestry, fishing and hunting uses; 1.8 percent construction-related business; 1.7 percent

transportation, communication, information, and utilities; and less than one percent of each of the following uses: general sales or services; and arts entertainment, and recreation. Approximately 30 percent of the subwatershed is privately owned and 70 percent is publicly owned. In terms of zoning, the watershed is 44.3 percent open space/conservancy; 26 percent forest; 18.8 percent water; 5.2 percent agriculture; 3.2 percent residential – higher density; 1.1 percent commercial; and less than one percent of each of the following types: public recreation, residential – lower density, government services, and unzoned.

The subwatershed has approximately 76.48 miles of roads with a road density of 3.2 miles per square mile. The subwatershed has approximately 1,410,545 square feet of impervious structural surfaces and 14,211,896 square feet of impervious road surfaces for a total of 15,622,441 square feet of impervious surfaces. The subwatershed has three bridges on SR 14 and include SPS RR, Gulch, and BN RR. Data for bridges on County or other roads was not available.

Known archaeological, cultural, or historical resources within the subwatershed include 28 historic properties, 53 archeological sites, and one cemetery.

The subwatershed has eight wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed. There are also four state cleanup site listings within the watershed.

Columbia River (Reach #1)
This reach has a total of 0.88 jurisdictional stream miles and 152.55 acres of shoreline jurisdictional area. The existing land uses within this reach are 90.3 percent undefined; 8.4 percent government services; and less than one percent of each of the following: transportation, communication, information, and utilities; agriculture, forestry, fishing and hunting uses; residence or accommodation functions; and mining and extraction establishments. Approximately 1.3 percent of the reach is privately owned and 98.7 percent is publicly owned. In terms of zoning, the reach is 85.4 percent water; 12.7 percent open space/conservancy; 1.8 percent public recreation; and less than one percent of government/service.

There are approximately 0.82 miles of roads within the reach. It has approximately 2,783 square feet of impervious structural surfaces and 258,280 square feet of impervious road surfaces for a total of 261,063 square feet of impervious surfaces. This reach has wellhead protection areas. No additional altered conditions are known to be present within this reach.***Columbia River (Reach #2)***
This reach has a total of 1.55 jurisdictional stream miles and 259.34 acres of shoreline jurisdictional area. The existing land uses within this reach are 80.4 percent undefined; 11.4 percent government services; 6.1 percent general sales or services; 1.1 percent mining and extraction establishments; and less than one percent of each of the following types: residence or accommodation functions; and agriculture,

forestry, hunting and fishing uses. Approximately 8.2 percent of the reach is privately owned and 91.8 percent is publicly owned. In terms of zoning, the reach is 77.6 percent water; 12.1 percent public recreation; 8 percent commercial; 1.4 percent residential – higher density; and less than one percent open space/conservancy.

There are approximately 1.69 miles of roads within the reach. It has approximately 100,650 square feet of impervious surface for structures and 360,180 square feet of impervious road surfaces for a total of 460,830 square feet of impervious surfaces. This reach has wellhead protection areas. There is a state cleanup listing within this reach. No additional altered conditions are known to be present within this reach.

Columbia River (Reach #3)

This reach has a total of 3.9 jurisdictional stream miles and 1,115.82 acres of shoreline jurisdictional area. The existing land uses within this reach are 84 percent undefined; 8.6 percent agriculture, forestry, fishing, and hunting uses; 3.7 percent transportation, communication, information, and utilities; 3.2 percent mining and extraction establishments; and less than one percent of the following types: residence or accommodation functions; and government services. Approximately 15.9 percent of the reach is privately owned and 84.1 percent is publicly owned. In terms of zoning, the reach is 88.8 percent water; 9.8 percent open space/conservancy; 1.3 percent forest; and less than one percent public recreation.

There are approximately 2.54 miles of roads within the reach. It has approximately 803,525 square feet of impervious road surfaces and no impervious surfaces for structures. No additional altered conditions are known to be present within this reach.

Columbia River (Reach #4)

This reach has a total of 6 jurisdictional stream miles and 1,366.24 acres of shoreline jurisdictional area. The existing land uses within this reach are 82.7 percent undefined; 9.3 percent government services; 3.6 percent agriculture, forestry, fishing, and hunting uses; 2.2 percent residence or accommodation functions; and 2.2 percent transportation, communication, information and utilities. Approximately 7.7 percent of the reach is privately owned and 92.3 percent is publicly owned. In terms of zoning, the reach is 86.1 percent water; 9.9 percent open space/conservancy; 2 percent forest; 1.2 percent residential – higher density; and less than one percent of each of the following types; public recreation; government/service; commercial; and residential – lower density.

There are approximately 5.22 miles of roads within the reach. It has approximately 5,757 square feet of impervious surface for structures and 1,565,069 square feet of impervious road surfaces, for a total of 1,570,826 square feet for both impervious area for structures and road surfaces. There is a state cleanup listing within this reach. No additional altered conditions are known to be present within this reach.

Columbia River (Reach #5)

This reach has a total of 1.23 jurisdictional stream miles and 423.84 acres of shoreline jurisdictional area. The existing land uses within this reach are 78.8 percent undefined; 13.1 percent government services; and 8.1 percent residence or accommodation functions. Approximately 8.1 percent of the reach is privately owned and 91.9 percent is publicly owned. In terms of zoning, the reach is 88.3 percent water; 5.3 percent commercial; 4.1 percent public recreation; 2 percent industrial and less than one percent residential – lower density.

There are approximately 0.68 miles of roads within the reach. It has approximately 138 square feet of impervious surface for structures and 130,720 square feet of impervious road surfaces, for a total of 130,858 square feet of impervious surfaces. There are two state cleanup listings within this reach. No additional altered conditions are known to be present within this reach.

4.4.22.6 Public Access

The subwatershed has 10.63 miles of trails. Skamania County Home Valley Park and Campground is the only park within the subwatershed. The subwatershed is accessible from SR 14 along the Columbia River.

4.4.22.7 Restoration Opportunities

There are state cleanup sites located within this subwatershed. Restoration opportunities within the County's shoreline jurisdiction along the Columbia River are limited by the location of the BNSF railroad and State Route highway 14 that parallel the Columbia River as well as the construction of dams on the Columbia River, which have altered natural ecosystem processes. However, potential restoration opportunities may include improving the channel structure and form around the tributary habitat. Bed channel and form, and instream structural complexity can be improved by restoring degraded riparian areas through planting or fencing riparian areas that can improve water quality, streamlining delivery of large wood to restoration sites, and reducing impacts that alter other natural processes (NOAA Fisheries 2013a).

4.4.23 Rock Creek (170701051202) – Map Sheets 5d and 5g

4.4.23.1 Overview

The Rock Creek HUC (170701051202) is approximately 27,353 total acres in size with 635.11 acres of shoreline jurisdictional area including 13.82 miles of shoreline. Using the WGS 84, the subwatershed's downstream location is 45.6894/-121.8882. The subwatershed is located in the south-central portion of Skamania County and borders the Columbia River to the south. The northern portions of the HUC are located within the Gifford Pinchot National Forest.

4.4.23.2 Reaches

Forest Creek: Starting at the confluence of an unnamed tributary, this reach flows north to south until its confluence with Rock Creek. Its downstream location is

45.7425/-121.9715, and its upstream location is 45.7554/-121.9655. This reach is not a shoreline of statewide significance.

Rock Creek Reach #1: The upper reach of Rock Creek flows northwest to southeast until the confluence of Forest Creek. Its downstream location is 45.7425/-121.9715, and its upstream location is 45.7711/-122.0452. This reach is not a shoreline of statewide significance.

Rock Creek Reach #2: From the confluence of Forest Creek until the confluence of Spring Creek. Its downstream location is 45.7196/-121.9229, and its upstream location is 45.7425/-121.9715. This reach is not a shoreline of statewide significance.

Rock Creek Reach #3: From the confluence of Spring Creek until its confluence with the Columbia River. Its downstream location is 45.6894/-121.8882, and its upstream location is 45.7196/-121.9229. In general, the County's jurisdiction is located on the northern side of Rock Creek. Some portions of the reach meander in and out of the County's and City of Stevenson's shoreline jurisdiction (see Map 1, sheets 5d and 5g). This reach is not a shoreline of statewide significance.

Spring Creek: Starting at the confluence of an unnamed tributary, this reach flows north to south until its confluence with Rock Creek. Its downstream location is 45.7196/-121.9229, and its upstream location is 45.7376/-121.9253. This reach is not a shoreline of statewide significance.

4.4.23.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soil types is described in Table 4-85.

Table 4-85. Surficial Geology and Soil Types - Rock Creek (170701051202)

Type	Percentage
Surficial Geology	
Andesite flows	62.1%
Mass-wasting deposits, mostly landslides	15.1%
Volcanoclastic deposits or rocks	6.6%
Continental sedimentary deposits or rocks, conglomerate	6.3%
Tuffs and tuff breccias	3.9%
Basalt flows	3.8%
Intrusive andesite; alluvium; artificial fill, including modified land; water	Less than 1% each
Soil Type	
Aschoff very gravelly loam, 30 to 65 % slopes	26.2%
Zygore gravelly loam, 30 to 65 % slopes	12.2%
Andic haplumbrepts, MED/LO-SK, M, FRG	10.0%
Steever stony clay loam, 2 to 30 % slopes	6.9%
Aschoff-Rock outcrop complex, 30 to 65 % slopes	6.2%
Aschoff very gravelly loam, 5 to 30 % slopes	5.6%
Zygore-Rock outcrop complex, 30 to 65 % slopes	5.1%
Zygore gravelly loam, 5 to 30 % slopes	3.8%

Type	Percentage
Andic cryumbrepts, MED/LO-SK, M	3.4%
Andic haplumbrepts, MED/C, M, FRG	3.4%
St. Martin gravelly silty clay loam, 30 to 65 % slopes	1.6%
Lithic orthents, andepts, cryands, udands	1.5%
Stevenson loam, 15 to 30 % slopes	1.5%
Steever stony clay loam, 30 to 65 % slopes	1.5%
St. Martin gravelly silty clay loam, 15 to 30 % slopes	1.3%
Stabler loam, 8 to 30 % slopes	1.2%
Skamania very fine sandy loam, 8 to 15 % slopes	1.1%
Mountzion clay loam, 15 to 30 % slopes	1.1%
Rock outcrop-Rubbleland complex; Mountzion clay loam, 2 to 15 % slopes; Andic Cryumbrepts, 5 to 65 % slopes; Stevenson loam, 2 to 15 % slopes; Stabler loam, 0 to 8 % slopes; Skamania very fine sandy loam, 15 to 30 % slopes; Bonneville stony sandy loam; Skamania very fine sandy loam, 0 to 8 % slopes; Arents, 0 to 5 % slopes; St. Martin gravelly silty clay loam, 2 to 15 % slopes; Steever-Rock outcrop complex, 2 to 30 % slopes; Washougal gravelly loam, 2 to 8 % slopes; Skamania very fine sandy loam, 30 to 40 % slopes; Lithic andic cryumbrepts, MED/LO-SK, M; Aquolls, fibrists, aquods; Xerorthents-Rock outcrop complex, 50 to 90 % slopes; Mountzion clay loam, 30 to 65 % slopes; Stabler loam, 30 to 65 % slopes; Riverwash; Water	Less than 1% each

Vegetated cover within the subwatershed is composed of 77.54 percent forested woodland, 20.4 percent recently disturbed or modified land, and one percent or less of the following types: agriculture, nonvascular or sparse vascular rock vegetation, open water, developed/other human use, and shrubland and/or grassland. The subwatershed also has approximately 4,137.70 acres of landslide hazard zones and a total of 92.10 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.4.23.4 Biological Resources

The PHS priority habitat types within the subwatershed include lake, freshwater forested/shrub wetland, freshwater pond, riverine wetland, "other" type of wetland, freshwater emergent wetland, cliffs/bluffs, herbaceous balds, talus slopes, and old-growth/mature forest as well as habitat for elk, Canada goose, and waterfowl. The PHS species within the subwatershed include northern spotted owl and Cascade torrent salamander. The non-PHS species monitored within the subwatershed include: reticulate sculpin, osprey, tailed frog, and Cope's giant salamander. In addition, fall Chinook and winter steelhead are present in lower sections of Rock Creek.

A total of 193.19 acres of NWI wetlands were identified within the subwatershed. These wetlands include 42.6 percent lake, 35.4 percent freshwater forested/shrub wetland, 11.8 percent freshwater pond, 4.7 percent riverine wetland, 3.4 percent other, and 2.2 percent freshwater emergent wetland.

4.4.23.5 Land Use and Altered Conditions

The existing land uses within the subwatershed are 77.2 percent government services; 17.2 percent mining and extraction establishments; 2.6 percent residence or accommodation functions; 2.3 percent agriculture, forestry, fishing and hunting uses; and less than one percent of each of the following uses: construction-related business; transportation, communication, information, and utilities; arts, entertainment, and recreation; and undefined use. Approximately 22.1 percent of the subwatershed is privately owned and 77.9 percent is publicly owned. In terms of zoning, the watershed is 69.7 percent unzoned, 23.8 percent forest, 2.2 percent residential – higher density, 1.7 percent residential – lower density, 1.4 percent open space/conservancy, and less than one percent of each of the following zones: commercial, public recreation, government/service, industrial and water.

The subwatershed has approximately 152.62 miles of roads and a road density of 3.57 miles per square mile. The subwatershed has approximately 1,442,784 square feet of impervious surface for structures and 24,752,350 square feet of impervious road surfaces for a total of 26,195,134 square feet of impervious surfaces. The subwatershed has one bridge on SR 14 over Rock Creek, data for bridges on County or other roads was not available.

Known archaeological, cultural, or historical resources within the subwatershed include five historic properties, 35 archaeological sites, and one cemetery.

The subwatershed has nine wellhead protection areas associated with Group A and Group B wells. No State 303d water quality issues have been identified within this subwatershed.

The dams within the subwatershed include Iman Lake Dam, which is located within the Skamania Lodge Golf Course (45.6912/-121.9107), and Little Brush Lake Dam, which drains to the non-jurisdiction LeBong Creek that is a tributary to Rock Creek (45.6991/-121.9280).

Forest Creek

This reach has a total of 1.05 jurisdictional stream miles and 51.07 acres of shoreline jurisdictional area. The only existing land use within this reach is government services. All of the reach is publicly owned and it is entirely unzoned. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

Rock Creek Reach #1

This reach has a total of 4.73 jurisdictional stream miles and 229.2 acres of shoreline jurisdictional area. The existing land use within this reach is 100 percent government services and is entirely publicly owned. In terms of zoning, the reach is 51.8 percent unzoned and 48.2 percent forest. There are approximately 2.68 miles of roads within

the reach yielding 547,760 square feet of impervious road surfaces. There are no additional impervious surface from structures. No additional altered conditions are known to be present within this reach.

Rock Creek Reach #2

This reach has a total of 3.31 jurisdictional stream miles and 159.64 acres of shoreline jurisdictional area. The existing land uses within this reach are 65 percent government services and 35 percent mining and extraction establishments. Approximately 35 percent of the reach is privately owned and 65 percent is publicly owned. All of the reach is entirely unzoned. There are approximately 0.61 miles of roads within the reach yielding 120,651 square feet of impervious road surfaces. There are no additional impervious surface from structures. No additional altered conditions are known to be present within this reach.

Rock Creek Reach #3

This reach has a total of 3.31 jurisdictional stream miles and 117.11 acres of shoreline jurisdictional area. The existing land uses within this reach are 43.0 percent agriculture, forestry, fishing and hunting uses, 38.7 percent mining and extraction establishments, 13.4 percent government services, 4.2 percent residence or accommodation functions, and less than one percent undefined. Approximately 86 percent of the reach is privately owned and 14.0 percent is publicly owned. In terms of zoning, the reach is 75.6 percent forest, 19.5 percent residential – higher density, and 4.8 percent unzoned.

There are approximately 0.17 miles of roads within the reach. It has approximately 9,360 square feet of impervious surface for structures and 29,859 square feet of impervious road surfaces for a total of 39,219 square feet of impervious surfaces. This reach has a wellhead protection area. No additional altered conditions are known to be present within this reach.

Spring Creek

This reach has a total of 1.42 jurisdictional stream miles and 69.16 acres of shoreline jurisdictional area. The existing land uses within this reach are 97.8 percent mining and extraction establishments and 2.2 percent government services. Approximately 97.8 percent of the reach is privately owned and 2.2 percent is publicly owned. In terms of zoning, the reach is 57.4 percent unzoned, 38.4 percent forest, and 4.1 percent residential – lower density. There are no impervious roads or surfaces within this reach. No additional altered conditions are known to be present within this reach.

4.4.23.6 Public Access

In terms of public access, the subwatershed has 11.06 miles of trails and one golf course, Skamania Lodge Golf Course, within the HUC. The subwatershed is from

accessible from SR 14 and access is also available on local forest service roads as well as Red Bluff Road that runs parallel to Rock Creek.

4.4.23.7 Restoration Opportunities

The upper and middle watersheds of Rock Creek have moderately impaired sediment conditions due to impaired conditions at the headwaters due to high road densities in sensitive areas (steep, erodible slopes). Managing forest practices to minimize sediment supply processes, runoff regime, and water quality as well as upgrading or removing problem forest roads will decrease the excessive amount of fine sediment and turbidity (Washington Forest Protection Association 2005). Past fires and forest practices have had the greatest impact on the lower mainstem of Rock Creek stream habitats. Preventing further degradation of stream channel structure, riparian function, and floodplain function is an important component of recovery. The channel's structure and stability can be improved by structurally modifying the channel morphology to create suitable habitat or by the placement of stable woody debris to enhance cover, pool formation, bank stability and sediment sorting (Lower Columbia Fish Recovery Board 2010).

4.4.24 Carson Creek – Columbia River (170701051204) – Map Sheets 5d, 5g, and 6b

4.4.24.1 Overview

The Carson Creek – Columbia River HUC (170701051204) is approximately 13,175.8 total acres in size with 2,808.71 acres of shoreline jurisdictional area including 6.47 miles of shoreline jurisdiction and 130.19 acres of jurisdictional waterbodies. Using the WGS 84, the subwatershed's downstream location is 45.6447/-121.9408, and its upstream location is 45.7042/-121.7932. The subwatershed includes seven reaches of the Columbia River, from Carson to the Bonneville Dam, and two jurisdictional lakes. Because the City of Stevenson has shoreline jurisdiction for Columbia River reach 10, it is not included in this analysis. City of North Bonneville is also present in this subwatershed and is updating their SMP for shorelines of the state under the City's jurisdiction. The City did not opt to pre-designate their Urban Area and the City's SMP extent does not include the Columbia River frontage from about the mid-point of Cascade Island downstream to the western point of Strawberry Island; this section of the Columbia remains under County jurisdiction until annexed by the City.

Columbia River Shoreline in Carson Creek – Columbia River HUC – 2007, depicting the Bonneville Dam and the City of North Bonneville (Washington State Department of Ecology Coastal Atlas 2015b)

4.4.24.2 Reaches

Columbia River Reach #6: This short reach encompasses Columbia River side of SR 14 as it crosses the confluence of the Wind River . Its downstream location is 45.7047/-121.7966, and its upstream location is 45.7042/-121.7932. This reach is a shoreline of statewide significance.

Columbia River Reach #7: From the west end of the Wind River confluence to Anderson Point, a landmark found on the Columbia River. Its downstream location is 45.7072/-121.8112, and its upstream location is 45.7047/-121.7966. This reach is a shoreline of statewide significance.

Columbia River Reach #8: From Anderson Point to the confluence of Nelson Creek, a non-jurisdictional stream. Its downstream location is 45.6956/-121.8591, and its upstream location is 45.7072/-121.8112. This reach is a shoreline of statewide significance.

Columbia River Reach #9: This reach is approximately 0.78 miles from the confluence of Nelson Creek, a non-jurisdictional stream to the City of Stevenson's boundary at the Columbia River near Kanaka Creek. Its downstream location is 45.6901/-121.8729, and its upstream location is 45.6956/-121.8591. This reach is a shoreline of statewide significance.

Columbia River Reach #11: This reach is approximately 1.19 miles and encompasses the Columbia River side of SR 14 from the eastern portion of Rock Cove to eastern boundary of Ashes Lake. Its downstream location is 45.6722/-121.8999, and its upstream location is 45.6821/-121.8823. This reach is a shoreline of statewide significance.

Columbia River Reach #12: From the eastern boundary Ashes Lake to just west of Sheridan Point. Its downstream location is 45.6527/-121.9137, and its upstream location is 45.6722/-121.8999. This reach is a shoreline of statewide significance.

Columbia River Reach #13: The furthest downstream reach within the subwatershed includes the portion east of Bonneville Dam. Its downstream location is 45.6447/-121.9408, and its upstream location is 45.6527/-121.9137. This reach is a shoreline of statewide significance.

Ashes Lake: This waterbody is located upstream of the Bridge of the Gods and west of the City of Stevenson, adjacent to the Columbia River. This lake was created from the earthen berm that was placed in the Columbia River for the BNSF railroad and SR 14. The center of this waterbody is at 45.6739/-121.9133. This reach is not a shoreline of statewide significance.

Ashes Lake – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

Wauna Lake: The waterbody is located west of the Bridge of the Gods and inland of Sheridan Point. The center of this waterbody is at 45.6632/-121.9216. This reach is not a shoreline of statewide significance.

Wauna Lake and Bridge of the Gods – 2007 (Washington State Department of Ecology Coastal Atlas 2015b)

4.4.24.3 Physical Environment

Information about the subwatershed's surficial geology (i.e., lithology) and soils is described in Table 4-86.

Table 4-86. Surficial Geology and Soil Types - Carson Creek – Columbia River (170701051204)

Type	Percentage
Surficial Geology	
Andesite flows	44.2 %
Mass-wasting deposits, mostly landslides	22.7%
Water	18.7%
Basaltic andesite flows	4.6%
Basalt flows	3.8%
Continental sedimentary deposits or rocks, conglomerate	3.7%
Artificial fill, including modified land, Alluvium	Less than 1% each
Soil s	
Water	20.0%
Steever stony clay loam, 2 to 30 % slopes	10.6%
Steever stony clay loam, 30 to 65 % slopes	9.3%
Stevenson loam, 15 to 30 % slopes	9.1%
St. Martin gravelly silty clay loam, 30 to 65 % slopes	6.7%
Stevenson loam, 30 to 50 % slopes	5.3%
Rock outcrop-Rubbleland complex	5.1%
Mountzion clay loam, 30 to 65 % slopes	4.1%
Stevenson loam, 2 to 15 % slopes	3.9%
St. Martin gravelly silty clay loam, 2 to 15 % slopes	3.2%
Steever-Rock outcrop complex, 2 to 30 % slopes	2.7%
Washougal gravelly loam, 2 to 8 % slopes	2.6%

Type	Percentage
Stabler loam, 30 to 65 % slopes	2.5%
Stabler loam, 0 to 8 % slopes	2.4%
St. Martin gravelly silty clay loam, 15 to 30 % slopes	2.0%
Stabler loam, 8 to 30 % slopes	1.8%
Steever-Rock outcrop complex, 30 to 65 % slopes	1.6%
Mountzion clay loam, 15 to 30 % slopes	1.2%
Xerorthents-Rock outcrop complex, 50 to 90 % slopes; Washougal gravelly loam, 8 to 30 % slopes; Skamania very fine sandy loam, 0 to 8 % slopes; Arents, 0 to 5 % slopes; Zygore gravelly loam, 30 to 65 % slopes; Typic Dystrandepts, 5 to 65 % slopes; Zygore gravelly loam, 5 to 30 % slopes; Bonneville stony sandy loam; McElroy gravelly loam, 5 to 15 % slopes; Skamania very fine sandy loam, 8 to 15 % slopes; Pits; Pilchuck very fine sandy loam; Rock outcrop-Xerorthents complex, 50 to 90 % slopes; Dam; Aschoff very gravelly loam, 30 to 65 % slopes	Less than 1% each

Vegetated cover within the subwatershed is composed of 43.6 percent forested woodland, 19.5 percent open water, 29.2 percent recently disturbed or modified land, 2.1 percent agriculture, 3.3 percent developed/other human use, 1.8 percent shrubland and/or grassland, and one less than one percent nonvascular or sparse vascular rock vegetation.

The subwatershed also has approximately 2989.4 acres of landslide hazard zones and a total of 2454.1 acres of 100-year FEMA floodplain. See Map 5 for pCMZs within this subwatershed.

4.4.24.4 Biological Resources

The PHS priority habitat types within the subwatershed include lake, freshwater pond, freshwater emergent wetland, freshwater forested/scrub wetland, riverine wetland, cliffs/bluffs, herbaceous balds, old-growth/mature forest, and talus slopes, as well as habitat for elk, Canada goose, and waterfowl. The PHS species within the subwatershed include northern spotted owl, mountain quail, and Larch Mountain salamander. The non-PHS species monitored within the subwatershed include osprey and sand roller.

Approximately 9.56 stream miles of Hanford reach fall Chinook, 0.91 stream miles of Bonneville bright fall Chinook, 0.61 stream miles of Lower Columbia Gorge fall chum, 0.81 stream miles of White Salmon River winter steelhead, and 0.15 stream miles of each Wind River summer steelhead, Wind River winter steelhead, Wind River spring Chinook, Wind River tule fall Chinook, and Wind River bright fall Chinook are found within the subwatershed. Adult fall chum salmon enter freshwater from mid-October through November and spawn early November to late December. Summer-run steelhead re-enter freshwater between May and October and require several months to mature before spawning, generally late February and early April. Winter-run steelhead re-enter freshwater between December and May as sexually mature fish and peak spawning occurs in late April and early May. Tule fall

Chinook enter freshwater from August to September and spawn late September to November. The bright fall Chinook generally return later than tule fall Chinook, are less mature when they enter the Columbia River, and spawn later in the year, typically from November to January. The Bonneville Dam acts as a partial migration barrier to salmon and steelhead populations that originate above the dam and both downstream-migrating juveniles and upstream-migrating adults experience delay, injury and mortality while trying to pass the dam (NOAA Fisheries 2013a).

A total of 2605.91 acres of NWI wetlands were identified within the subwatershed. These wetlands include 95 percent lake as Bonneville Reservoir, 4.3 percent freshwater pond, and less than one percent freshwater emergent wetland, freshwater forested/shrub wetland, and riverine wetland.

4.4.24.5 Land Use and Altered Conditions

The existing land uses within the subwatershed include 31.6 percent mining and extraction establishments; 17.9 percent residence or accommodation functions; 17.9 percent government services; 17.8 percent undefined; 9.9 percent agriculture, forestry, fishing, and hunting uses; 4.1 percent construction-related business; and less than one percent of each of the following uses: transportation, communication, information, and utilities; general sales or services; and arts, entertainment, and recreation. Approximately 64.4 percent of the subwatershed is privately owned and 35.6 percent is publicly owned. In terms of zoning, the watershed is 54.5 percent forest, 19.4 percent water, 13 percent residential – higher density, 4.5 percent residential – lower density, 3.5 percent open space/conservancy, 2.4 percent commercial, 1.9 percent unzoned, and less than one percent of each of the following types: industrial, government/service, and public recreation.

The subwatershed has approximately 121.10 miles of roads with a road density of 5.88 miles per square mile. The subwatershed has approximately 2,729,210 square feet of impervious structural surfaces and 20,763,146 square feet of impervious road surfaces for a total of 23,492,356 square feet impervious surfaces. The subwatershed has one bridge, BN RR, on SR 14; data for bridges on County or other roads was not available.

Known archaeological, cultural, or historical resources within the subwatershed include 36 historic properties, one historic barn register, 49 archaeological sites, 17 cemeteries, and two historic districts.

The subwatershed has 13 wellhead protection areas associated with Group A and Group B wells. Water quality functions have been significantly altered and/or adversely impacted according to the two 303(d) listing associated with temperature and dioxins within the subwatershed (Appendix A Map 12). See the Water Quality Assessment and 303d List for more information (Ecology 2016). There are three state cleanup site listings within the subwatershed.

Bonneville Dam is located at the extreme southwest boundary of subwatershed and located east of North Bonneville (45.6446/-121.9407).

Columbia River Reach #6

This reach has a total of 0.17 jurisdictional stream miles and 101.78 acres of shoreline jurisdictional area. The existing land uses within this reach are 54.1 percent undefined; and 45.9 percent residence or accommodation function. Approximately 45.9 percent of the reach is privately owned and 54.1 percent is publicly owned. In terms of zoning, the reach is 87.3 percent water, 10 percent industrial and 2.7 percent commercial.

There are approximately 0.38 miles of roads within the reach's shoreline jurisdiction. It has approximately 303 square feet of impervious structural surfaces and 61,110 square feet of impervious road surfaces for a total of 61,413 square feet of impervious surfaces. No additional altered conditions are known to be present within this reach.

Columbia River Reach #7

This reach has a total of 0.73 jurisdictional stream miles and 431.88 acres of shoreline jurisdictional area. The existing land uses within this reach are 51.7 percent undefined; 42.1 percent agriculture, forestry, fishing, and hunting uses; 5.4 percent transportation, communication, information, and utilities; and less than one percent residence or accommodation functions. Approximately 48.3 percent of the reach is privately owned and 51.7 percent is publicly owned. In terms of zoning, the reach is 90.6 percent water, 5.1 percent open space/conservancy, and 4.3 percent forest.

There are approximately 0.15 miles of roads within the reach's shoreline jurisdiction. It has approximately 920 square feet of impervious structural surfaces and 48,101 square feet of impervious road surfaces for a total of 49,022 square feet for impervious surfaces. No additional altered conditions are known to be present within this reach.

Columbia River Reach #8

This reach has a total of 2.45 jurisdictional stream miles and 912.21 acres of shoreline jurisdictional area. The existing land uses within this reach are 83 percent undefined; 10.6 percent residence or accommodation functions; 5 percent agriculture, forestry, fishing, and hunting uses; and 1.4 percent transportation, communication, information, and utilities. Approximately 17 percent of the reach is privately owned and 83 percent is publicly owned. In terms of zoning, the reach is 90.4 percent water, 7.5 percent residential – higher density, 1.8 percent commercial, and less than one percent of each of the following zones: open space/conservancy and forest.

There are approximately 0.48 miles of roads within the reach's shoreline jurisdiction. It has approximately 15,577 square feet of impervious structural surface and 87,451 square feet of impervious road surfaces for a total of 103,028 square feet of

impervious surfaces. No additional altered conditions are known to be present within this reach.

Columbia River Reach #9

This reach has a total of .78 jurisdictional stream miles and 257.59 acres of shoreline jurisdictional area. The existing land uses within this reach are 75.7 percent undefined, 13.4 percent government services, 9.3 percent residence or accommodation functions, 1 percent agriculture, forestry, fishing, or hunting, and less than one percent transportation, communication, information, and utilities. Approximately 89.1 percent of the reach is publicly owned and 10.9 percent of the reach is privately owned. In terms of zoning, the reach is 87.6 percent water, 11.2 percent commercial, 1.2 percent residential higher density, and less than one percent industrial.

There are approximately 0.88 miles of roads within the reach's shoreline jurisdiction. It has approximately 199,323.86 square feet of impervious road surfaces and approximately 10,083.89 square feet of impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Columbia River Reach #11

This reach has a total of 1.19 jurisdictional stream miles and 392.98 acres of shoreline jurisdictional area. The existing land uses within this reach are 87.7 percent undefined, 7.4 percent residence or accommodation functions, 2.8 percent agriculture, forestry, fishing, and hunting, and 2.2 percent general sales or services. Approximately 87.7 percent of the reach is publicly owned and 12.3 percent is privately owned. In terms of zoning, the reach is 92.4 percent water, 6.1 percent industrial, 1.5 percent commercial, and less than one percent forest.

There are approximately 0.40 miles of roads within the reach's shoreline jurisdiction. It has approximately 71,037.44 square feet of impervious road surfaces, and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Columbia River Reach #12

This reach has a total of 1.66 jurisdictional stream miles and 262.96 acres of shoreline jurisdictional area. The existing land uses within this reach are 72 percent undefined; 13.9 percent government services; 12.5 percent residence or accommodation functions; 1.6 percent agriculture, forestry, hunting and fishing uses; and less than one percent of transportation, communication, information, and utilities. Approximately 14.1 percent of the reach is privately owned and 85.9 percent is publicly owned. In terms of zoning, the reach is 80.5 percent water and 19.5 percent forest.

There are approximately 0.55 miles of roads within the reach's shoreline jurisdiction. It has approximately 173,048 square feet of impervious road surfaces, and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Columbia River Reach #13

This reach has a total of 1.46 jurisdictional stream miles and 79.10 acres of shoreline jurisdictional area. The existing land uses within this reach are 93.8 percent undefined, and 6.2 percent government services. The reach is 100 percent publicly owned. In terms of zoning, the reach is 99.5 percent water and less than one percent unzoned.

There are approximately 0.13 miles of roads within the reach's shoreline jurisdiction. It has approximately 13,410 square feet of impervious structural surfaces and 14,608 square feet of impervious road surfaces for a total of 28,018 square feet of impervious surfaces. There are two State 303d listings in this reach for temperature and dioxins. No additional altered conditions are known to be present within this reach.

Ashes Lake

This reach has a total of 60.98 acres of shoreline waterbody and 101.25 acres of jurisdictional area. The existing land uses within this reach are 83.5 percent agriculture, forestry, fishing, and hunting uses; 11.4 percent undefined; 4 percent residence or accommodation functions; and 1.1 percent government services. Approximately 88.58 percent of the reach is privately owned and 12.67 percent is publicly owned. In terms of zoning, the reach is 56.4 percent water, 43.6 percent forest, and less than one percent commercial.

The reach has approximately 1.38 miles of roads and a road density of 8.74 miles per square mile within the reach's shoreline jurisdiction. It has approximately 276,619 square feet of impervious road surfaces, and no impervious structural surfaces. No additional altered conditions are known to be present within this reach.

Wauna Lake

This reach has a total of 69.22 acres of shoreline waterbody and 129.32 acres of jurisdictional area. The existing land uses within this reach are 85.7 percent construction-related business, and 14.3 percent residence or accommodation functions. The reach is 100 percent privately owned. In terms of zoning, the reach is 53.5 percent water and 46.5 percent forest.

The reach has approximately 0.43 miles of roads and a road density of 2.12 miles per square mile within the reach's shoreline jurisdiction. It has approximately 43,101 square feet of impervious structural surfaces and 66,287 square feet of impervious road surfaces for a total of 109,389 square feet of impervious surfaces.

4.4.24.6 Public Access

The subwatershed has 1.73 miles of trails. The subwatershed is accessible from SR 14, which runs parallel to the Columbia River, as well as from local roads.

4.4.24.7 Restoration Opportunities

Ecological conditions have been significantly altered and/or adversely impacted according to the 303(d) listings associated with temperature and dioxins within the subwatershed. Restoration opportunities within the County's shoreline jurisdiction are limited by the Bonneville Dam on the Columbia River, which has altered natural ecosystem processes. Regulating the water flows of the Columbia River can impact the habitat in a number of ways including but not limited to: decreasing the delivery of nutrient and dissolved oxygen, reducing water levels, and elevating water temperature. Restoration opportunities within the County's jurisdiction may include addressing stormwater runoff from roads and bridges; removing bank armoring; creating resting habitat for fish; and restoring riparian conditions by eradicating invasive species and replanting with native trees and shrubs.

5.0 SHORELINE ENVIRONMENT DESIGNATIONS AND PRELIMINARY RECOMMENDATIONS

5.1 Shoreline Environment Designations

This section is an overview of shoreline environment designations described by Ecology guidelines (WAC 173-26-211). The guidelines state that master programs must contain a system by which shoreline areas can be classified into specific designations that take into account existing land uses, the biological and physical character of the shoreline, and the goals and aspirations of the community. The shoreline environment designations (SEDs) should be assigned in such a way that, when development is proposed, its patterns and intensity protect the existing ecological functions of the shoreline (i.e., no net loss) and are consistent with policies for the restoration of degraded shorelines and the local comprehensive plan.

The six shoreline environment designations of the Ecology guidelines are: natural, rural conservancy, aquatic, high intensity, urban conservancy, and shoreline residential. The Aquatic SED applies to in-water portions of shoreline jurisdiction waterward of OHWM while the other five apply to upland portions landward of OHWM. In order to comply with Washington requirements, the County may use the Guidelines' SEDs and/or develop comparable designations based on local conditions to update their existing system of shoreline environment designations to be consistent with WAC 173-26-211. The six WAC environment designations are described below.

Natural

The purpose of the natural environment designation is to protect shoreline areas that are intact or minimally degraded and are relatively free of human influence. In order to maintain ecological functions and ecosystem-wide processes, only very low intensity uses will be allowed in the natural environment designation. The management policies for this designation restrict any use that would substantially degrade the ecological functions or natural character of the shoreline area; these restricted uses include commercial and industrial uses, non-water oriented recreation, roads, utility corridors, parking areas, significant vegetation removal, or shoreline modification. The following uses may be allowed if they are consistent with the purpose of this environment designation and other regulatory requirements:

- Single-family residential developments with a density and intensity that are limited as necessary to protect ecological functions.
- Commercial forest uses that meets the conditions of the state's Forest Practices Act (RCW 76.09).
- Agricultural uses of a very low intensity.
- Scientific, historical, cultural, educational research uses and low-intensity water-oriented recreational access uses.

Rural Conservancy

The purpose of the rural conservancy environment designation is to protect ecological functions, conserve existing natural resources and valuable historic and cultural areas for sustained resource use, achieve natural floodplain processes, and provide recreational opportunities. Uses in this designation may include low-impact outdoor recreation, timber harvesting on a sustained-yield basis, aquaculture, other natural resource-based low-intensity uses, and low-intensity residential development. The following uses may be allowed if they are consistent with the purpose of this environmental designation and other regulatory requirements:

- Low-intensity, water-oriented commercial and industrial uses in areas that have a history of past uses or at unique sites in rural communities that possess shoreline conditions and services to support the use.
- Water-dependent, water-related, and water-enjoyment recreation facilities that do not deplete the resource over time, such as boating facilities, angling, hunting, wildlife viewing trails, and swimming beaches, provided significant adverse impacts to the shoreline are mitigated.
- Mining and related activities may be an appropriate use within the rural conservancy environment when conducted in a manner consistent with the environment policies and the provisions of WAC 173-26-241 (3)(h), RCW 36.70A.170, and WAC 365-190-070.
- Construction of new structural shoreline stabilization and flood control works where there is a documented need to protect an existing structure or ecological functions and mitigation is applied.

Aquatic

The purpose of the aquatic environment designation is to protect, restore, and manage the unique in-water characteristics and resources of the areas waterward of the OHWM. Uses may include new over-water structures only for water-dependent uses, public access, or ecological restoration. All developments and uses on navigable waters or their beds should be located and designed to minimize interference with surface navigation, consider impacts to public views, and allow the safe, unobstructed passage of fish and wildlife, particularly species that depend on migration. Uses that affect the ecological function of freshwater habitats adversely should not be allowed except when necessary to achieve the objectives of RCW 90.58.020, and if their impacts are mitigated according to WAC 173-26-201.

High Intensity

The purpose of the high-intensity environment designation is to provide for high-intensity water-oriented commercial, transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in previously degraded areas. First priority should be given to water-dependent uses, while second priority should be given to water-related and water-enjoyment uses.

Non-water oriented uses should not be allowed except as part of mixed-use developments or in in limited situations where they do not conflict with or limit opportunities for water-oriented uses or where there is no direct access to the shoreline. Full utilization of existing urban areas should be achieved before the further expansion of intensive development is allowed. The analysis of the full utilization of urban waterfronts should consider the potential for displacement of non-water oriented uses by water-oriented uses. Where feasible, visual and physical public access should be required. Aesthetic objectives should be achieved by methods such as controlling signage, siting development appropriately, implementing screening and architectural standards, and maintaining natural vegetative buffers.

Urban Conservancy

The purpose of the urban conservancy environment designation is to protect and restore ecological functions of open space, floodplains, and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses. Potential uses should preserve the natural character of the area or promote the preservation of open space, floodplains, or sensitive lands either directly or over the long term. Uses that result in restoration of ecological functions should be allowed if the use is otherwise compatible with the purpose of the environment and the setting. The designation includes the achievement of public access and public recreation objectives whenever they are feasible and significant ecological impacts can be mitigated. Water-oriented uses should be given priority over non-water oriented uses. For shoreline areas adjacent to commercially navigable waters, water-dependent uses should be given highest priority. Mining and related activities may be an appropriate use within the urban conservancy environment when conducted in a manner consistent with the environment policies and the provisions of WAC 173-26-241 (3)(h), RCW 36.70A.170, and WAC 365-190-070.

Shoreline Residential

The purpose of the shoreline residential environment designation is to accommodate residential development, appurtenant structures, and appropriate public access and recreational uses that are consistent with maintaining ecological functions and ecosystem-wide processes. Local governments may establish two or more different shoreline residential environments to accommodate different shoreline densities or conditions. Multifamily and multi-lot residential and recreational developments should provide joint use for community recreational facilities and public access. Access, utilities, and public services should be available and adequate to serve existing needs and/or planned future development. Commercial development should be limited to water-oriented uses, such as but not limited to boat rentals, marinas, etc.

5.2 Preliminary Shoreline Environment Designation Recommendations

Using the shoreline environment designations defined by Ecology guidelines (WAC 173-26-211), preliminary shoreline environment designations were developed for each shoreline reach within Skamania County. The County's original shoreline management master program (June 1974, revised August 1975 and July 1986) is still in effect and applies only three shoreline environment designations (Urban, Conservancy, or Natural) to broad sections or entire water bodies in shoreline jurisdiction. Therefore, this analysis is the first to provide preliminary shoreline environment designations at the reach-level scale that use modern definitions and reflect current shoreline conditions. The official shoreline environmental designations are provided in Skamania County's SMP.

The preliminary recommendations for reaches in Skamania County are shown in Table 5-1. In cases where multiple shoreline environment designations are recommended for a given shoreline reach, specifications for each designation are provided. The recommendations take into account the existing land use, the biological and physical character of the shoreline, and the goals and aspirations of the County (see Table 5-1 and section 4.0). The attributes that were considered included the following:

- ***Existing Land Use***: percent of land use type by reach.
- ***Zoning***: percent of zoning type by reach.
- ***Ecological Function***: qualitative assessment by the presence of WDFW priority habitats, WDFW priority species, and WDFW sensitive data for fish presence within the sub-watershed (12-digit HUC) of each reach, as well as 303(d) listings, dams, aerial photography, and impervious surface cover. Each reach was classified as poor, fair, or good.

In addition, the analysis used the Northwest Forest Plan (USFS 1994) to distinguish various management types and recommend shoreline environment designations for areas in the Gifford Pinchot National Forest, which accounts for a significant portion of the County's shorelines. The management types are discussed further below.

- ***Adaptive Management (AM)*** – federal forest lands within the range of the northern spotted owl that have been designated as areas where new approaches for the integration and achievement of ecological, economic, and other social objectives can be developed and tested.
- ***Administratively Withdrawn (AW)*** – areas that are identified in current national forest management plans at the district level as having preferred recreational value and are not scheduled for timber harvest.
- ***Congressionally Withdrawn (CW)*** – lands that have been reserved by Congress for particular non-timber harvest purposes. Included in this category are national parks and monuments, wilderness areas, wild and scenic rivers, and national wildlife refuges.

- ***Late Successional Reserve (LSR) and Managed Late Successional Reserve (MLSR)*** – areas that are designed to maintain a functional, interactive, late-successional and old-growth forest ecosystem. They serve as habitat for late-successional and old-growth related species such as the northern spotted owl.
- ***Matrix (M)*** – these lands are the remaining federal forest lands in the range of the northern spotted owl that remain outside reserves, congressionally withdrawn areas, and administratively withdrawn areas. Matrix lands are available to third-party private contractors for timber harvest at varying levels.
- ***Other Owners (OO)*** – land assumed to be owned by non-USFS entities.

The preliminary recommendations for shoreline environment designations for reaches in Skamania County are shown in Table 5-1. The table also lists potential land use conflicts, which are discussed in section 5.3. In general, the analysis applied the rural conservancy shoreline environment designation to reaches with these management types: matrix, and other owners. The natural shoreline environment designation was generally applied to reaches with the following management types: administratively withdrawn, Congressionally withdrawn, adaptive management, late successional reserve, and managed late successional reserve. Areas with residential zoning or land use were generally designated as "shoreline residential." Finally, areas with commercial or industrial uses were generally designated as "high intensity" or "urban conservancy," depending on the intensity of use. In some cases, multiple shoreline environment designations are recommended for a given shoreline reach. All in-water portions waterward of OHWM for each shoreline reach are proposed for the aquatic shoreline environment designation regardless of the upland shoreline environment designation.

Table 5-1. Preliminary Shoreline Environment Designations and Potential Land Use Conflicts by Reach

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
WRIA 26 Cowlitz							
Muddy Fork Cispus River (170800040303) – Sheet 2							
170800040303 Cispus River, Muddy F 1		SG	UZ	Good	Congressionally Withdrawn, Adaptive Management	Natural	Low
170800040303 Spring Creek		SG	UZ	Good	Adaptive Management	Natural	Low
170800040303 Cispus River, Muddy F 2		SG	UZ	Good	Adaptive Management	Natural	Low
170800040303 Unnamed, 2		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800040303 Unnamed, 1		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800040303 Horseshoe Lake		SG	UZ	Good	Adaptive Management	Natural	Low
Chambers Creek – Cispus River (170800040304) – Sheet 2							
170800040304 Cispus River 1		SG	UZ	Good	Adaptive Management	Natural	Low
170800040304 Cispus River 2		SG	UZ	Good	Adaptive Management	Natural	Low
170800040304 Midway Meadows		SG	UZ	Good	Adaptive Management	Natural	Low
170800040304 Unnamed, 3		SG	UZ	Good	Adaptive Management	Natural	Low
170800040304 Unnamed, 2		SG	UZ	Good	Adaptive Management	Natural	Low
170800040304 Unnamed, 1		SG	UZ	Good	Adaptive Management	Natural	Low
Adams Creek (170800040305) – Sheet 2							

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
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RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800040305 Adams Creek 1		SG	UZ	Good	Congressionally Withdrawn, Adaptive Management	Natural	Low
170800040305 Killen Creek		SG	UZ	Good	Adaptive Management	Natural	Low
170800040305 Adams Creek 2		SG	UZ	Good	Adaptive Management	Natural	Low
East Canyon Creek (170800040306) – Sheet 2							
170800040306 Summit Prairie Creek		SG	UZ	Good	Adaptive Management	Natural	Low
170800040306 East Canyon Creek 1		SG	UZ	Good	Adaptive Management	Natural	Low
170800040306 Dark Creek		SG	UZ	Good	Adaptive Management	Natural	Low
170800040306 East Canyon Creek 2		SG	UZ	Good	Adaptive Management	Natural	Low
170800040306 East Canyon Creek 3		SG	UZ	Poor	Adaptive Management	Natural	Low
170800040306 Council Lake		SG	UZ	Good	Adaptive Management	Natural	Low
170800040306 Takhlakh Lake		SG	UZ	Good	Adaptive Management	Natural	Low
Cat Creek – Cispus River (170800040307) – Sheet 2							
170800040307 Cispus River 6		SG	UZ	Good	Adaptive Management	Natural	Low
170800040307 Cispus River 3		SG	UZ	Good	Adaptive Management	Natural	Low
170800040307 Cispus River 5		SG	UZ	Good	Adaptive Management	Natural	Low

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800040307 Cat Creek		SG	UZ	Good	Adaptive Management	Natural	Low
170800040307 Cispus River 4		SG	UZ	Good	Adaptive Management	Natural	Low
Blue Lake – Cispus River (170800040309) – Sheet 2							
170800040309 Cispus River 7		SG	UZ	Good	Adaptive Management	Natural	Low
McCoy Creek (170800040401) – Sheet 2							
170800040401 McCoy Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
Yellowjacket Creek (170800040402) – Sheet 2							
170800040402 Yellowjacket Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800040402 Mosquito Meadows		SG	UZ	Good	Administratively Withdrawn, Matrix	Natural (Administratively Withdrawn areas), Rural Conservancy (Matrix areas)	Medium
Quartz Creek (170800040407) – Sheet 1							
170800040407 Quartz Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
Headwaters Green River (170800050401) – Sheets 1 and 1a							
170800050401 Green River 1		SG	UZ	Poor	Congressionally Withdrawn, Matrix	Natural (Congressionally Withdrawn), Rural Conservancy (Matrix areas)	Medium
170800050401 Green River 2		SG, MN	UZ	Poor	Congressionally Withdrawn, Matrix, Other Owner	Natural (Congressionally Withdrawn), Rural Conservancy	Medium

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
						(Matrix and Other Owner areas)	
170800050401 Shovel Lake		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050401 Panhandle Lake		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050401 Venus Lake		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050401 Deadmans Lake		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050401 Unnamed		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
Upper Green River (170800050402) – Sheet 1a							
170800050402 Miners Creek		SG, MN	UZ	Good	Congressionally Withdrawn, Matrix, Other Owner	Natural (Congressionally Withdrawn areas), Rural Conservancy (Matrix and Other Owner areas)	Medium
170800050402 Green River 3		MN	UZ	Good	Other Owner	Rural Conservancy	Low
170800050402 Hanaford Lake		MN	UZ	Good	Other Owner	Rural Conservancy	Low
170800050402 Elk Lake		MN	UZ	Good	Other Owner	Rural Conservancy	Low
170800050402 Unnamed, 2		SG, MN	UZ	Good	Congressionally Withdrawn, Matrix, Other Owner	Natural (Congressionally Withdrawn areas), Rural Conservancy (Matrix and Other Owner areas)	Medium

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800050402 Unnamed, 1		SG, MN	UZ	Good	Other Owner	Rural Conservancy	Medium
Coldwater Creek (170800050501) – Sheets 1 and 1a							
170800050501 Spirit Lake Outflow 2		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050501 Coldwater Creek		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050501 South Coldwater Creek		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050501 Coldwater Lake		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
Headwaters North Fork Toutle River (170800050502) – Sheets 1 and 1a							
170800050502 Forsyth Glacier		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050502 Studebaker Creek		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050502 Sasquatch Steps		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050502 Spirit Lake Outflow 1		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800050502 Toutle River N F		SG	UZ	Poor	Congressionally Withdrawn	Natural	Low
170800050502 Spirit Lake		SG, CR, MN	UZ	Good	Congressionally Withdrawn	Natural	Medium
170800050502 Saint Helens Lake		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
WRIA 27 Lewis							
Boulder Creek – Lewis River (170800020101) – Sheet 2							
170800020101 Big Spring Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020101 Riley Creek		SG	UZ	Good	Congressionally Withdrawn, Administratively Withdrawn, Matrix	Natural (Congressionally Withdrawn and Administratively Withdrawn areas), Rural Conservancy (Matrix areas)	Medium
170800020101 Lewis River 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020101 Boulder Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020101 Lewis River 1		SG	UZ	Good	Congressionally Withdrawn, Matrix	Natural Congressionally Withdrawn areas), Rural Conservancy (Matrix areas)	Medium
Swampy Creek (170800020102) – Sheet 2							
170800020102 Pass Creek		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
170800020102 Swampy Creek 1		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
170800020102 Swampy Creek 2		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020102 Unnamed, 2		SG	UZ	Good	Administratively Withdrawn, Matrix	Natural (Administratively Withdrawn areas), Rural Conservancy (Matrix areas)	Medium
170800020102 Unnamed, 1		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
Twin Falls Creek – Lewis River (170800020103) – Sheet 2							
170800020103 Lewis River 5		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020103 Twin Falls Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020103 Lewis River 4		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
170800020103 Lewis River 3		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
170800020103 Pin Creek		SG	UZ	Good	Late Successional Reserve, Matrix	Natural (Late Successional Reserve areas), Rural Conservancy (Matrix areas)	Medium
Poison Creek – Lewis River (170800020104) – Sheet 2							

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UD – undefined

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RH – residential - higher density
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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020104 Lewis River 6		SG	UZ	Good	Late Successional Reserve, Matrix	Natural (Late Successional Reserve areas), Rural Conservancy (Matrix areas)	Medium
Quartz Creek (170800020105) – Sheet 2							
170800020105 Quartz Creek 3		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020105 Quartz Creek 2		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020105 Snagtooth Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020105 Straight Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020105 Quartz Creek 1		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020105 French Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
Tillicum Creek – Lewis River (170800020106) – Sheets 1, 2, and 4							
170800020106 Lewis River 9		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020106 Lewis River 8		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020106 Tillicum Creek		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
170800020106 Lewis River 7		SG	UZ	Poor	Late Successional Reserve	Natural	Low

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020106 Alec Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020106 Unnamed		SG	UZ	Good	Late Successional Reserve	Natural	Low
Big Creek (170800020107) – Sheets 3 and 4							
170800020107 Big Creek		SG	UZ	Good	Late Successional Reserve, Administratively Withdrawn	Natural	Low
Cussed Hallow-Lewis River (170800020108) – Sheets 1 and 3							
170800020108 Lewis River 12		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020108 Chickoon Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020108 Lewis River 11		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020108 Lewis River 10		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020108 Cussed Hollow		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020108 Spencer Meadow		SG	UZ	Good	Late Successional Reserve	Natural	Low
Rush Creek (170800020109) – Sheets 3 and 4							
170800020109 Meadow Creek 1		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
170800020109 Rush Creek 1		SG	UZ	Good	Matrix	Rural Conservancy	Medium

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020109 Meadow Creek 2		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
170800020109 Rush Creek 2		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
170800020109 Placid Lake		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800020109 Unnamed, 1		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020109 Unnamed, 2		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
170800020109 Lone Butte Meadows		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
Curly Creek (170800020110) – Sheet 3							
170800020110 Outlaw Creek 1		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020110 Hardtime Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020110 Outlaw Creek 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020110 Curly Creek		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix area), Rural Conservancy (Late	Medium

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
						Successional Reserve area)	
Little Creek – Lewis River (170800020111) – Sheets 3 and 3b							
170800020111 Lewis River 15		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020111 Pepper Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020111 Lewis River 13		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020111 Miller Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020111 Lewis River 17		SG, UD, RA, MN, AF	RL, UZ, FO	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RL and RA areas), Rural Conservancy (all other areas)	Low
170800020111 Lewis River 14		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020111 Lewis River 16		SG	UZ	Poor	Late Successional Reserve	Natural	Low
Upper Muddy River (170800020201) – Sheet 1							
170800020201 Muddy River 1		SG	UZ	Good	Congressionally Withdrawn, Late Successional Reserve	Natural	Low

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170800020201 Smith Creek 3		SG	UZ	Good	Congressionally Withdrawn, Administratively Withdrawn	Natural	Low
170800020201 Ape Canyon		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800020201 Smith Creek 2		SG	UZ	Good	Congressionally Withdrawn, Administratively Withdrawn	Natural	Low
170800020201 Nelson Glacier		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170800020201 Smith Creek 1		SG	UZ	Good	Congressionally Withdrawn, Administratively Withdrawn	Natural	Low
Clearwater Creek (170800020202) – Sheet 1							
170800020202 Clearwater Creek 2		SG	UZ	Poor	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
170800020202 Bean Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020202 Clearwater Creek 1		SG	UZ	Poor	Congressionally Withdrawn, Late Successional Reserve, Matrix	Natural (Congressionally Withdrawn and Later Successional Reserve Areas), Rural Conservancy (Matrix areas)	Medium

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
Upper Clear Creek (170800020203) – Sheet 1							
170800020203 Wright Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020203 Wright Meadow		SG	UZ	Good	Late Successional Reserve	Natural	Low
Lower Clear Creek (170800020204) – Sheets 1, 3, and 3b							
170800020204 Clear Creek		SG	UZ, RL	Poor	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Low
Lower Muddy River (170800020205) – Sheets 1 and 3b							
170800020205 Muddy River 5		SG, MN, AF, RA, UD	RL, FO	Poor	Not Applicable	Shoreline Residential (RL and RA areas), Rural Conservancy (all other areas)	Medium
170800020205 Muddy River 4		SG	UZ, RL	Poor	Late Successional Reserve	Natural (Late Successional Reserve areas), Rural Conservancy (all other areas)	Low
170800020205 Muddy River, U T		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020205 Muddy River 3		SG	UZ	Good	Late Successional Reserve	Natural	Low

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WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020205 Muddy River 2		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020205 Cedar Flats		SG	RL	Good	Not Applicable	Shoreline Residential	Low
Pine Creek (170800020301) – Sheets 1 and 3b							
170800020301 Pine Creek 4		MN, SG, AF, RA, UD	RL, FO	Good	Not Applicable	Shoreline Residential (RL and RA areas), Rural Conservancy (all other areas)	Medium
170800020301 Pine Creek 3		MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800020301 Pine Creek, U T, 1		MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800020301 Pine Creek 2		MN, SG	FO	Good	Not Applicable	Rural Conservancy	Medium
170800020301 Pine Creek, U T, 2		MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800020301 Pine Creek 1		MN, SG	FO, UZ	Good	Matrix	Rural Conservancy	Medium
170800020301 Pine Creek, U T, 3		MN, SG	FO, UZ	Good	Matrix	Rural Conservancy	Medium
Upper Swift Reservoir (170800020302) – Sheets 3b and 3d							
170800020302 Swift Reservoir, U T		MN, AF, TC	RL	Fair	Not Applicable	Shoreline Residential	Medium
170800020302 Lewis River 18		UD, SG, MN, AF, RA	RL	Good	Not Applicable	Shoreline Residential	Medium
170800020302 Lewis River 19		MN, UD, AF	RL, FO	Good	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020302 Swift Reservoir 3		TC, SG, MN, AF	RL	Good	Not Applicable	Shoreline Residential	Medium

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020302 Swift Reservoir 1		TC, UD, MN, SG, AF	RL	Good	Not Applicable	Shoreline Residential	Medium
170800020302 Swift Reservoir 2		TC, SG, MN, UD, RA, AF, CR	RL, FO	Fair	Not Applicable	Shoreline Residential (RL and RA areas), Aquatic (aquatic areas), Rural Conservancy (all other areas)	Medium
Drift Creek (170800020303) – Sheets 3b and 3d							
170800020303 Drift Creek		SG, MN	FO, RL	Fair	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020303 Swift Reservoir 4		SG, TC, MN	RL, FO	Good	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020303 Swift Reservoir 5		TC, SG	RL, FO	Good	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
Swift Creek (170800020304) – Sheets 1 and 3a							
170800020304 Swift Creek 4		MN, SG, AF, TC	RL	Fair	Not Applicable	Shoreline Residential (RL areas),	Medium

KEY

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UD – undefined

Zoning Types

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CO – commercial
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RL – residential - lower density
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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
						Rural Conservancy (all other areas)	
170800020304 Swift Creek, U T		MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800020304 Swift Creek 3		MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800020304 Swift Creek 2		MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800020304 West Fork Swift Creek		MN, SG	FO, RL	Good	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020304 Worm Flows		SG, MN, AF, RA, UD	UZ, RL, FO	Fair	Administratively Withdrawn	Natural (Administratively Withdrawn areas), Shoreline Residential (RL and RA areas), Rural Conservancy (all other areas)	Low
170800020304 Swift Creek 1		SG, MN	RL, UZ, FO	Fair	Matrix	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020304 Swift Reservoir 11		TC, SG, AF, RA, MN	RL, FO	Good	Not Applicable	Shoreline Residential (RL and RA areas), Rural Conservancy (all other areas)	Medium

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Zoning Types

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CO – commercial
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RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020304 Swift Reservoir 10		TC, SG, MN	RL, FO	Good	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
Lower Swift Reservoir (170800020305) – Sheets 3a, 3b, 3c, and 3d							
170800020305 Range Creek		MN	FO, RL	Fair	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020305 Marble Creek		MN, AF, UD, RA, SG	FO, RL	Fair	Not Applicable	Shoreline Residential (RL and RA areas), Rural Conservancy (all other areas)	Medium
170800020305 Swift Reservoir 6		TC, SG, MN	RL, FO	Good	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020305 Swift Reservoir 8		SG, TC, MN	RL, FO	Poor	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020305 Swift Reservoir 12		SG, TC	RL	Poor	Not Applicable	Shoreline Residential (RL areas), High Intensity (Swift Dam),	Medium

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RL – residential - lower density
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WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
						Rural Conservancy (all other areas)	
170800020305 Swift Reservoir 7		TC, SG, MN, AF	RL, FO	Fair	Not Applicable	Shoreline Residential (RL areas), Aquatic (aquatic areas), Rural Conservancy (all other areas)	Medium
170800020305 Swift Reservoir 9		TC, SG, AF, MN	RL	Poor	Not Applicable	Shoreline Residential (RL areas), Aquatic (aquatic areas), Rural Conservancy (all other areas)	Medium
Cougar Creek – Lewis River (170800020401) – Sheet 3a							
170800020401 Ole Creek		SG, MN	FO, RL	Good	Not Applicable	Shoreline Residential (RL), Rural Conservancy (all other areas)	Medium
170800020401 Lewis River 20		UD, SG, TC, MN	RL	Poor	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
170800020401 Glacial runoff, unnamed		SG, TC	RL	Good	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	Medium
Upper Sioxon Creek (170800020402) – Sheets 3, 3c, and 3d							

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UD – undefined

Zoning Types

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RL – residential - lower density
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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020402 Calamity Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020402 Siouxon Creek 1		SG	UZ	Good	Late Successional Reserve	Natural	Low
170800020402 Siouxon Creek 2		SG	FO, UZ	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Rural Conservancy (all other areas)	Low
170800020402 Siouxon Creek 3		SG	UZ	Good	Not Applicable	Rural Conservancy	High
170800020402 Chinook Creek		SG	UZ	Good	Not Applicable	Rural Conservancy	High
North Siouxon Creek (170800020403) – Sheet 3c							
170800020403 North Siouxon Creek		SG	FO	Good	Not Applicable	Rural Conservancy	Medium
Lower Siouxon Creek (170800020404) – Sheets 3 and 3c							
170800020404 West Creek		SG	UZ	Poor	Late Successional Reserve	Natural	Low
170800020404 Siouxon Creek 5		SG	UZ	Poor	Late Successional Reserve	Natural (Late Successional Reserve areas), Rural Conservancy (all other areas)	Low
170800020404 Siouxon Creek, U T		SG	UZ	Good	Late Successional Reserve	Natural (Late Successional Reserve), Rural Conservancy (all other areas)	Low
170800020404 Siouxon Creek 4		SG	UZ, FO	Poor	Late Successional Reserve	Natural	Low

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UD – undefined

Zoning Types

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CO – commercial
FO – forest
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OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020404 Siouxon Creek 6		SG	FO, UZ	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Rural Conservancy (all other areas)	Low
Headwaters East Fork Lewis River (170800020501) – Sheet 5							
170800020501 Lewis River, E F, Green F		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
Slide Creek – East Fork Lewis River (170800020502) – Sheet 5							
170800020502 McKinley Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020502 Lewis River, E F 1		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
170800020502 Lewis River, E F 4		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
170800020502 Lewis River, E F 2		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
170800020502 Lewis River, E F 3		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
170800020502 Little Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020502 Slide Creek		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
Copper Creek (170800020503) – Sheets 5 and 5b							
170800020503 Copper Creek		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
Upper Canyon Creek (170800020601) – Sheet 3							
170800020601 Puny Creek		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn area)	Medium
170800020601 Jakes Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020601 Canyon Creek 1		SG	UZ	Good	Matrix	Rural Conservancy	Medium

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UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800020601 Canyon Creek 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020601 Sorehead Creek		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
Lower Canyon Creek (170800020603) – Sheet 3							
170800020603 Big Rock Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170800020603 Canyon Creek 3		SG	UZ	Good	Matrix and Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
Headwaters Kalama River (170800030301) – Sheet 1							
170800030301 Dryer Glacier		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
WRIA 28 – Salmon - Washougal							
Headwaters Washougal River (170800010601) – Sheets 5, 5b, and 5c							
170800010601 Washougal River 4		SG, MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010601 Bluebird Creek		SG	FO, UZ	Good	Adaptive Management (partially)	Rural Conservancy	Low
170800010601 Washougal River 3		SG, MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010601 Prospector Creek		SG	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010601 Deer Creek		SG	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010601 Washougal River 2		SG	FO, UZ	Good	Not Applicable	Rural Conservancy	Medium

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UD – undefined

Zoning Types

AG – agriculture
CO – commercial
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RH – residential - higher density
RL – residential - lower density
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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800010601 Washougal River 1		SG	FO, UZ	Good	Administratively Withdrawn (partially)	Natural (in Administratively Withdrawn areas), Rural Conservancy (all other areas)	Low
170800010601 Lookout Creek		SG	FO, UZ	Good	Not Applicable	Rural Conservancy	Medium
Upper Washougal River (170800010602) – Sheets 5b, 5c, 5e, and 5f							
170800010602 Dougan Creek		SG	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010602 Washougal River 6		SG, MN, RA, AF, UD	FO	Good	Not Applicable	Shoreline Residential (RA areas), Rural Conservancy (all other areas)	Medium
170800010602 Stebbins Creek		SG, MN, AF	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010602 Washougal River 5		SG, MN, RA, AF	FO	Good	Not Applicable	Shoreline Residential (RA areas), Rural Conservancy (all other areas)	Medium
West Fork Washougal River (170800010603) – Sheets 5b and 5e							
170800010603 Washougal River, W F 4		RA, MN, SG, UD, AF	FO, RL, RH	Poor	Not Applicable	Shoreline Residential (RA, RL, and RH areas), Rural Conservancy (all other areas)	High
170800010603 Wildboy Creek		MN, RA	FO, RL	Poor	Not Applicable	Shoreline Residential (RA and RL areas),	Medium

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RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
						Rural Conservancy (all other areas)	
170800010603 Washougal River, W F 3		RA, MN, UD	FO, RL	Fair	Not Applicable	Shoreline Residential (RA and RL areas), Rural Conservancy (all other areas)	Medium
170800010603 Hagen Creek		MN, SG	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010603 Washougal River, W F 2		SG, MN	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010603 Washougal River, W F, U T		MN, SG	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010603 Washougal River, W F 1		SG, AF, MN, RA	FO, UZ	Good	Not Applicable	Shoreline Residential (RA areas), Rural Conservancy (all other areas)	High
Middle Washougal River (170800010604) – Sheet 5e							
170800010604 Canyon Creek		RA, AF, MN, SG	RL, RH	Poor	Not Applicable	Shoreline Residential (RH, RL, and RA areas), Rural Conservancy (all other areas)	Medium
170800010604 Washougal River 8		RA, AF	RH, RL	Poor	Not Applicable	Shoreline Residential (RH, RL, and RA areas), Rural Conservancy (all other areas)	Medium

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UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800010604 Washougal River 7		RA, SG, AF, MN, CR, UD	FO, RL, RH	Poor	Not Applicable	Shoreline Residential (RH, RL, and RA areas), Urban Conservancy (CR areas), Rural Conservancy (all other areas)	High
Lower Washougal River (170800010606) – Sheet 5e							
170800010606 Washougal River 9		RA, MN, AF, UD, SG, AE	RH, CO, RL	Poor	Not Applicable	Shoreline Residential (RH, RL, and RA areas), Urban Conservancy (AE areas), Rural Conservancy (all other areas)	High
Tanner Creek – Columbia River (170800010801) – Sheets 5c, 5f, and 5g							
170800010801 Greenleaf Creek		SG, MN, AF	FO	Good	Not Applicable	Rural Conservancy	Medium
170800010801 Hamilton Creek 1		SG, MN, UD	FO, OC, PR, CO, ID	Good	Not Applicable	Natural (OC areas), High Intensity (ID and CO areas), Rural Conservancy (all other areas).	High
170800010801 Columbia River 15		UD	OC, WT	Fair	Not Applicable	Natural (OC areas), Aquatic (WT areas), Urban Conservancy (all other areas)	Low
170800010801 Columbia River 14		UD, SG, AF	WT, OC, UZ	Poor	Not Applicable	Natural (OC areas), Aquatic (WT areas), Urban Conservancy (all other areas)	High

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Zoning Types

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OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
Hamilton Creek – Columbia River (170800010802) – Sheets 5f and 5g							
170800010802 Duncan Creek		SG, MN, RA, AF, UD, CR	FO, RH, CO, AG, OC	Fair	Not Applicable	Natural (OC areas), Shoreline Residential (RA areas), High Intensity (CO areas), Rural Conservancy (all other areas)	High
170800010802 Columbia River 19		UD, SG	WT, OC	Poor	Not Applicable	Natural (OC areas), Aquatic (WT areas), Rural Conservancy (all other areas)	Low
170800010802 Columbia River 18		UD, RA, AF, SG	WT, RH, OC, AG	Poor	Not Applicable	Natural (OC areas), Aquatic (WT areas), Shoreline Residential (RH and RA areas), Urban Conservancy (all other areas)	High
170800010802 Columbia River 16		UD	OC, WT	Good	Not Applicable	Natural (OC areas), Aquatic (WT areas), Rural Conservancy (all other areas)	Low
170800010802 Columbia River 17		UD, SG, AF	OC, WT, PR	Poor	Not Applicable	Natural (OC areas), Aquatic (WT areas), Rural Conservancy (all other areas)	Low

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AG – agriculture
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RH – residential - higher density
RL – residential - lower density
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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800010802 Woodward Creek		SG, RA, UD	FO, PR, RH, OC	Poor	Not Applicable	Natural (OC areas), Shoreline Residential (RH and RA areas), Rural Conservancy (all other areas)	High
170800010802 Franz Lake		SG, RA, UD	OC, AG, FO	Good	Not Applicable	Natural (OC areas), Shoreline Residential (RA areas), Rural Conservancy (all other areas)	Medium
170800010802 Woody's Lake		AF, SG, UD, RA, CR	WT, RH, OC, PR, CO, FO	Good	Not Applicable	Natural (OC areas), Aquatic (WT areas), Shoreline Residential (RH and RA areas), High Intensity (CO areas), Rural Conservancy (all other areas)	High
Viento Creek – Columbia River (170800010803) – Sheets 5e and 5f							
170800010803 Columbia River 22		UD, SG, AF, MN, RA	WT, FO, OC, RH	Good	Not Applicable	Natural (OC areas), Aquatic (WT areas), Shoreline Residential (RH and RA areas), Rural Conservancy (all other areas)	High

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Zoning Types

AG – agriculture
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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170800010803 Columbia River 21		UD, RA, SG	WT, RH, FO	Good	Not Applicable	Shoreline Residential (RH and RA areas), Aquatic (WT areas), Rural Conservancy (all other areas)	High
170800010803 Columbia River 20		UD, SG, RA	WT, OC, FO	Good	Not Applicable	Natural (OC areas), Aquatic (WT areas), Rural Conservancy (all other areas)	Medium
170800010803 Unnamed Waterbody		RA	FO	Good	Not Applicable	Shoreline Residential (RA areas), Rural Conservancy (all other areas)	Medium
Latourell Creek – Columbia River (170800010804) – Sheet 5e							
170800010804 Columbia River 23		UD, SG	WT, OC, FO	Good	Not Applicable	Natural (OC areas), Aquatic (WT areas), Rural Conservancy (all other areas)	Medium
WRIA 29 – Wind-White Salmon							
Headwaters White Salmon River (170701050801) – Sheets 2 and 4							
170701050801 Cascade Creek 3		SG	UZ	Good	Congressionally Withdrawn, Matrix	Natural (Congressionally Withdrawn areas), Rural Conservancy (Matrix areas)	Medium
170701050801 Cascade Creek UT		SG	UZ	Good	Congressionally Withdrawn	Natural	Low

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12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701050801 Salt Creek		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170701050801 Cascade Creek 2		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170701050801 White Salmon River 1		SG	UZ	Good	Matrix	Natural	Medium
170701050801 Cascade Creek 1		SG	UZ	Good	Congressionally Withdrawn	Natural	Low
170701050801 Swampy Meadows		SG	UZ	Good	Administratively Withdrawn, Matrix	Natural (Administratively Withdrawn areas), Rural Conservancy (Matrix Areas)	Medium
Morrison Creek – White Salmon River (170701050802) – Sheet 4							
170701050802 White Salmon River 4		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050802 White Salmon River 3		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
170701050802 Buck Creek		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
170701050802 White Salmon River 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050802 Morrison Creek		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas),	Medium

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
						Natural (Late Successional Reserve areas)	
170701050802 Unnamed		SG	UZ	Good	Matrix	Rural Conservancy	Medium
Gotchen Creek – White Salmon River (170701050803) – Sheet 4							
170701050803 Hole In The Ground Creek		SG	UZ	Good	Late Successional Reserve	Natural	High
170701050803 White Salmon River 5		SG	UZ	Good	Matrix	Rural Conservancy	Medium
Upper Trout Creek (170701050804) – Sheets 2 and 4							
170701050804 Little Goose Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Cultus Creek 1		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Cultus Creek 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Trout Lake Creek 3		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Meadow Creek		SG	UZ	Good	Administratively Withdrawn, Matrix	Natural (Administratively Withdrawn areas), Rural Conservancy (Matrix areas)	Medium
170701050804 Trout Lake Creek 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Mosquito Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Trout Lake Creek 1		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Unnamed, 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Big Mosquito Lake		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050804 Grand Meadows		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas),	Medium

KEY

Existing Land Use

AE – arts, entertainment, and recreation
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MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
						Natural (Administratively Withdrawn areas)	
170701050804 Unnamed, 1		SG	UZ	Good	Matrix	Rural Conservancy	Medium
Lower Trout Lake Creek (170701050805) – Sheet 4							
170701050805 Dry Creek		SG	UZ	Good	Managed Late Successional Reserve	Natural	Low
170701050805 Trout Lake Creek 4		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
170701050805 Unnamed		SG	UZ	Good	Late Successional Reserve, Managed Late Successional Reserve	Natural	Low
Buck Creek (170701050810) – Sheet 6a							
170701050810 Buck Creek		CR, RA	RL	Good	Not Applicable	Shoreline Residential (RL and RA areas), Rural Conservancy (all other areas)	Medium
North Weston Lake-White Salmon River (Northwestern Lake) (170701050811) – Sheet 6d							
170701050811 White Salmon River 6		TC, UD, CR, SG, MN, AF	OC, RL, WT, GV, UZ	Poor	Not Applicable	Natural (OC areas), Aquatic (WT areas), High Intensity (CR and TC areas), Rural Conservancy (all other areas)	High
Dry Creek – Lost Creek (170701050901) – Sheet 4							

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701050901 Lost Creek 2		SG	UZ	Poor	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn areas)	Medium
170701050901 Dry Creek		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701050901 Lost Creek 1		SG	UZ	Poor	Matrix	Rural Conservancy	Medium
170701050901 Forlorn Lakes		SG	UZ	Good	Administratively Withdrawn	Natural	Low
Lava Creek (170701050902) – Sheet 4, 6, and 6a							
170701050902 Lava Creek, U T		SG	FO	Good	Not Applicable	Rural Conservancy	Medium
170701050902 Goose Lake Outlet		SG	UZ	Fair	Administratively Withdrawn	Natural	Low
170701050902 Lava Creek 1		SG	UZ, FO	Fair	Matrix, Administratively Withdrawn	Natural (Administratively Withdrawn areas), Rural Conservancy (Matrix areas and all other areas)	Medium
170701050902 Lava Creek 2		SG, MN, RA, UD	FO, RL, RH	Fair	Not Applicable	Shoreline Residential (RH and RL areas), Rural Conservancy (all other areas)	
170701050902 Goose Lake		SG	UZ	Fair	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Administratively Withdrawn area)	Medium

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701050902 Unnamed, 2		SG	UZ	Good	Matrix, Congressionally Withdrawn	Rural Conservancy (Matrix areas), Natural (Congressionally Withdrawn areas)	Medium
170701050902 Unnamed, 1		SG	UZ	Good	Matrix, Congressionally Withdrawn	Natural (Congressionally Withdrawn areas), Rural Conservancy (Matrix and all other areas)	Medium
Upper Little White Salmon River (170701050903) – Sheets 4 and 6a							
170701050903 Lusk Creek		MN, SG	FO, UZ	Good	Matrix	Rural Conservancy	Medium
170701050903 Little White Salmon River 1		MN, SG	FO, UZ	Poor	Not Applicable	Rural Conservancy	High
Middle Little White Salmon River (170701050904) – Sheet 6a							
170701050904 Little White Salmon River 2		MN, SG, RA, AF	FO, RL, UZ	Poor	Not Applicable	Shoreline Residential (RL areas), Rural Conservancy (all other areas)	High
170701050904 Moss Creek		SG, MN, RA	FO, RL, UZ	Good	Matrix	Shoreline residential (RL areas), Rural Conservancy (all other areas)	Medium

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
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MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701050904 Little White Salmon River 3		MN, SG, RA, AF, UD	FO, RH, RL	Poor	Not Applicable	Shoreline Residential (RH and RL areas), Rural Conservancy (all other areas)	High
Lower Little White Salmon River (170701050905) – Sheet 6c							
170701050905 Little White Salmon River 4		MN, SG, RA, RC, AF	RH, OC, RL	Fair	Not Applicable	Shoreline Residential (RH and RL areas), Natural (OC areas), Rural Conservancy (all other areas)	High
170701050905 Drano Lake		UD, SG, AF, TC	WT, OC, PR	Fair	Not Applicable	Shoreline Residential (RH and RL areas), Natural (OC areas), Aquatic (WT areas), Rural Conservancy (all other areas)	Low
Headwaters Wind River (170701051001) – Sheet 3							
170701051001 McClellan Meadows		SG	UZ	Good	Administratively Withdrawn	Natural	Low
Falls Creek (170701051002) – Sheets 3 and 4							
170701051002 Black Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051002 Falls Creek 2		SG	UZ	Good	Late Successional Reserve, Administratively Withdrawn	Natural	Low

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051002 Falls Creek 1		SG	UZ	Good	Matrix, Administratively Withdrawn	Rural Conservancy (Matrix areas), Natural (Late Successional areas)	Medium
170701051002 Unnamed, 2		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051002 Unnamed, 1		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051002 Black Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
Dry Creek (170701051003) – Sheet 3							
170701051003 Dry Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051003 Big Hollow Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
Trapper Creek – Wind River (170701051004) – Sheets 3 and 5a							
170701051004 Cold Creek		RA, SG, UD	RH, UZ	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low
170701051004 Trapper Creek		SG	UZ	Good	Congressionally Withdrawn, Late Successional Reserve	Natural	Low
170701051004 Wind River 1		SG	UZ	Good	Late Successional Reserve	Natural	Low

KEY

Existing Land Use

AE – arts, entertainment, and recreation
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RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051004 Wind River 2		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051004 Wind River 4		RA, AF, MN, SG, UD	RH, UZ, CO	Fair	Late Successional Reserve	Natural (Late Successional Reserve areas), High Intensity (CO areas), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low
170701051004 Wind River 3		SG, RA, UD	RH, UZ	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low
170701051004 Unnamed Waterbody		RA, SG, UD	RH, UZ	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low
Trout Creek (170701051005) – Sheet 5							

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051005 Trout Creek		RA, AF, SG, MN, UD	RH, UZ	Good	Not Applicable	Shoreline Residential (RH areas), Rural Conservancy (all other areas)	High
170701051005 Unnamed, 2		SG	UZ	Good	Matrix	Rural Conservancy	Medium
170701051005 Unnamed, 1		SG	UZ	Good	Matrix, Late Successional Reserve	Rural Conservancy (Matrix areas), Natural (Late Successional Reserve areas)	Medium
Panther Creek (170701051006) – Sheets 4, 5a, 5d, 6, and 6b							
170701051006 Panther Creek 4		RA, MN, SG, AG, UD	RH, UZ, FO	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low
170701051006 Cedar Creek		SG, AF, MN, UD	UZ, RH	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051006 Panther Creek 3		SG, RA, MN, AF, UD	UZ, RH	Good	Late Successional Reserve	Natural (Late Successional Reserve area), Shoreline Residential (RH area), Rural Conservancy (all other areas)	Low
170701051006 Mouse Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051006 Eightmile Creek		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051006 Panther Creek 2		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051006 Panther Creek 1		SG	UZ	Fair	Late Successional Reserve	Natural	Low
Bear Creek (170701051007) – Sheets 6 and 6b							
170701051007 Bear Creek, U T		SG	UZ	Good	Late Successional Reserve	Natural	Low
170701051007 Bear Creek 2		SG, MN, RA, AF	UZ, FO, RH	Good	Late Successional Reserve	Natural (Late Successional Reserve area), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low
170701051007 Bear Creek 1		SG	UZ	Good	Late Successional Reserve	Natural	Low
Little Wind River – Wind River (170701051008) – Sheet 6b							

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051008 Wind River 7		GS, UD, AF, RA, SG, MN	WT, OC, CO, PR, RL, RH, FO	Fair	Other Owner	Shoreline Residential (RH areas), High Intensity (ID and CO areas), Aquatic (WT and PR areas), Rural Conservancy (all other areas)	Low
170701051008 Little Wind River		SG, MN, TC, RA, AF	FO, CO, OC	Good	Not Applicable	High Intensity (CO and TC areas), Shoreline Residential (RH areas), Natural (OC areas), Rural Conservancy (all other areas)	High
170701051008 Wind River 6		SG, AF, MN, CR, RA, GS	OC, RL, UZ, FO, CO, ID, RH	Good	Other Owner	Shoreline Residential (RH areas), High Intensity (ID and CO areas), Rural Conservancy (all other areas)	Low

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051008 Wind River 5		MN, AF, SG, RA, UD	UZ, RH, FO, RL	Good	Late Successional Reserve	Natural (Late Successional Reserve areas), Shoreline Residential (RH areas), Rural Conservancy (all other areas)	Low
Grays Creek – Columbia River (170701051106) – Sheets 6b and 6c							
170701051106 Columbia River 5		UD, SG, RA	WT, CO, PR, ID, RL	Poor	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), High Intensity (ID and CO areas), Urban Conservancy (all other areas)	High
170701051106 Columbia River 3		UD, AG, TC, MN, RA, SG	WT, OC, FO, PR	Poor	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), Natural (OC areas), Urban Conservancy (all other areas)	Medium
170701051106 Columbia River 1		UD, SG, TC, AF, RA, MN	WT, OC, PR, GV	Poor	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), Natural (OC areas), Urban Conservancy (all other areas)	High

KEY

Existing Land Use

AE – arts, entertainment, and recreation
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CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051106 Columbia River 4		UD, SG, AF, RA, TC	WT, OC, FO, RH, PR, GV, CO, RL	Poor	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), Natural (OC areas), High Intensity (CO areas), Urban Conservancy (all other areas)	High
170701051106 Columbia River 2		UD, SG, GS, MN, RA, AF	WT, PR, CO, RH, OC	Poor	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), High Intensity (CO areas), Urban Conservancy (all other areas)	High
Rock Creek (170701051202) – Sheets 5d and 5g							
170701051202 Rock Creek 3		AF, MN, SG, RA, UD	RH, UZ	Poor	Not Applicable	Shoreline Residential (RA areas), Rural Conservancy (all other areas)	High
170701051202 Spring Creek		MN, SG	UZ, FO, RL	Good	Adaptive Management (partially)	Shoreline residential (RL areas), Rural Conservancy (all other areas)	Low
170701051202 Rock Creek 2		SG, MN	UZ	Fair		Rural Conservancy	High

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CR – construction related business
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RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051202 Forest Creek		SG	UZ	Good	Adaptive Management (partially)	Natural	Low
170701051202 Rock Creek 1		SG	UZ, FO	Fair	Not Applicable	Rural Conservancy	High
Carson Creek – Columbia River (170701051204) – Sheets 5d, 5g, and 6b							
170701051204 Columbia River 13		UD, SG	WT, UZ	Poor	Not Applicable	Aquatic (WT areas), Urban Conservancy (all other areas)	High
170701051204 Columbia River 12		UD, SG, RA, AF, TC	WT, FO	Fair	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), Urban Conservancy (all other areas)	Low
170701051204 Columbia River 6		UD, RA	WT, ID, CO	Fair	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), High Intensity (ID and CO areas), Urban Conservancy (all other areas)	High
170701051204 Columbia River 8		UD, RA, AF, TC	CO, OC, FO	Fair	Not Applicable	Shoreline Residential (RA areas), High Intensity (CO areas), Urban Conservancy (all other areas)	High

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

12-Unit HUC Number and Reach Name		Existing Land Use	Zoning	Ecological Function	Gifford Pinchot National Forest Management Type (if applicable)	Preliminary Shoreline Environment Designation	Potential Land Use Conflicts
170701051204 Columbia River 7		UD, AF, TC, RA	WT, OC, FO	Fair	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), Urban Conservancy (all other areas)	Medium
170701051204 Wauna Lake		CR, RA	WT, FO	Poor	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), High Intensity (CR areas), Rural Conservancy (all other areas)	Medium
170701051204 Ashes Lake		AF, UD, RA, SG	WT, FO, CO	Poor	Not Applicable	Shoreline Residential (RA areas), Aquatic (WT areas), High Intensity (CO areas), Rural Conservancy (all other areas)	Medium

KEY

Existing Land Use

AE – arts, entertainment, and recreation
AF – agriculture, forestry, fishing, hunting
CR – construction related business
GS – general sales or services
MN – mining
RA – residence or accommodation functions
SG – services government
TC – transportation, communication, information, utilities
UD – undefined

Zoning Types

AG – agriculture
CO – commercial
FO – forest
GV – government/service
ID – industrial
OC - open space/conservancy
RH – residential - higher density
RL – residential - lower density
UZ – unzoned
WT - water

5.3 Land Use Conflicts and Potential Development

5.3.1 Introduction

One of the central tenets of the SMA (RCW 90.58.020) is to accommodate preferred shoreline uses, which include "single-family residences and appurtenant structures; ports; shoreline recreational uses, including but not limited to, parks, marinas, piers, and other public improvements facilitating public access to shorelines of the state; industrial and commercial developments, which are particularly dependent on their location on or use of the shorelines of the state; and other development that will provide an opportunity for substantial numbers of people to enjoy the shorelines of the state."

In addition, the SMP guidelines specify use preferences in the following order:

(1) Protection and restoration of ecological functions.

(2) Water-dependent and water-related uses in harbor areas.

(3) Other water-related and water-enjoyment uses.

(4) Single-family uses without significant ecological impacts and which do not displace water-dependent uses.

(5) Non-water-oriented uses where uses above are not appropriate or where these uses contribute to the goals of the SMA.

The SMP guidelines in WAC 173-26-201(3)(d)(ii) require that inventory and characterization reports include a shoreline use analysis with the following elements: (1) an estimate of demand for future shoreline space, (2) potential use conflicts, (3) current shoreline use patterns, and (4) projected trends. The following land use analysis addresses all four WAC requirements. To achieve these elements, the following steps were taken to conduct the shoreline use analysis : (1) characterize existing shoreline use patterns, (2) project trends to estimate future demand for shoreline space, and (3) identify potential use conflicts.

5.3.2 Existing Shoreline Use Patterns

Existing land use patterns in Skamania County are detailed by reach in Chapter 4 of this document. In summary, approximately 3/4ths of the County is under federal ownership in the GPNF beginning at a point of latitude near the town of Stabler and extending northward. In the National Forest, there are highly restrictive land use regulations that focus recreational uses, limit the development of urban uses (residential, commercial, and most industrial uses) and promote resource conservation and extraction (forestry), where appropriate. The southernmost 5 to 10 mile area of the County north of the Columbia River is in the Columbia Gorge National Scenic Area where restrictive regulations apply to new uses outside of

urban areas. Therefore, a vast majority of the County is under tight land use controls which limit demand and the ability to establish new uses.

Existing development in the County is predominately residential and focused along the Columbia River and its tributaries in the Columbia River Gorge. The Swift Reservoir and surrounding area in the northern portion of the County is one exception that falls outside of the National Forest and where recreational uses and vacation homes are located on isolated portions of the lake. Uses in the West End near Washougal and areas surrounding the cities of North Bonneville and Stevenson and the Gorge urban areas of Carson, Home Valley, and Underwood are predominantly single-family residential and accessory structures, recreational facilities, and open space (preferred uses under the SMA and WAC) interspersed with agriculture, pockets of commercial, forestry, and public facilities, such as roads, the BNSF railroad. Developed shorelines in south County include the Washougal River, Canyon Creek, the Washougal River West Fork; Woody's Lake, Duncan Creek, Ashes Lake, Wauna Lake, Wind River, Panther Creek, Muddy Creek, and Bear Creek; and along the White Salmon and Little White Salmon Rivers in east County.

5.3.3 Future Shoreline Uses and Demand

No detailed demand analysis for various shoreline uses is available in the County's, Skamania County Economic Development Council's (SCEDC), or Port of Skamania's plans. Therefore, the land use analysis performed in this section relies primarily on assessment of policies and regulations that control land use. Because Skamania County is a highly regulated land use environment, regulations are a better indicator of development that may occur than unfettered market forces. These policies and regulations are contained in the County's comprehensive plan, subarea plans, zoning code, the Columbia River Gorge National Scenic Area (NSA) Regulations (Title 22, Skamania County Code), and the Northwest Forest Plan. This shoreline use analysis evaluates the plans and codes to determine the conflicting shoreline uses that may be permitted. In addition, an examination of County permit data for a five-year period (2011-2016) was examined to establish what shoreline uses are in highest demand.

5.3.3.1 Future Shoreline Uses

Regulations and comprehensive plans are a major determinant of what types of shoreline uses will be allowered where, especially in Skamania County development is largely restricted to the southern developed portions of the County. Documents reviewed for the land use analysis include the following list. Detailed summaries of these plans and their regulations and conclusions are provided in Attachment D.

- County's Comprehensive Plan (Skamania County, 2007a)
- County subarea plans (West End, Swift Reservoir, and Carson)

- Port of Skamania County's Comprehensive Scheme of Harbor Improvements (Port, 2013)
- SCEDC's 2003 Community Action Plan Update (Skamania County EDC, 2003)
- Skamania County zoning code (Title 21, Skamania County Code)
- Columbia River Gorge National Scenic Area (NSA) Regulations (Title 22, Skamania County Code)
- The Northwest Forest Plan

The documents listed above were examined to determine the most likely shoreline uses that may be permitted in the County. In general, these plans and codes confine intensive residential, commercial, and industrial development to areas where development has historically occurred in the southern portion of the County. In addition, the analysis was informed by a discussion with County land use permitting staff about development trends for nonpreferred shoreline uses.

In general, the distribution of land uses outlined in the Comprehensive Plan are concentrated in the southern region of the County and, more particularly, in the subareas. Per the Comprehensive Plan, shorelines that are already developed in south Skamania County are likely to continue to undergo new development, including the Washougal River, Canyon Creek, the Washougal River West Fork, Woody's Lake, Duncan Creek, Ashes Lake, Wauna Lake, Wind River, Panther Creek, Muddy Creek, and Bear Creek, and along the White Salmon and Little White Salmon Rivers in east County. Potential development along these shorelines generally consists of high- and low-density residential, commercial, industrial, and open space, as shown on Map 09 in the Map Portfolio in Appendix A.

The Carson Subarea is a Gorge Urban Area, which consists of a larger density of residential and commercial structures than can be found throughout most of unincorporated Skamania County. One shoreline water body – the Wind River – is within the vicinity of the Carson Subarea. The Wind River is located just east, and adjacent to the Carson Subarea. Designated land uses that are located near or within shoreline jurisdiction of the Wind River include Rural Residential, Rural Estate, High Density Residential, Industrial, and Destination Resort. The vast majority of land in the Carson Subarea within shoreline jurisdiction is designated for low-density residential uses with more limited areas of industrial and resort land. There are a large number of vacant/underimproved parcels in the Carson area, where new shoreline development is most likely to happen. Agricultural lands also occur throughout the plan area.

The West End Subarea is dominated by West End Commercial Resource Lands and West End Forest Lands in the north portion of the subarea, with Rural Lands, and Neighborhood Commercial Lands in the southwest corner of the subarea. Agricultural uses are also sprinkled throughout the plan area. A review of the

building permit records shows that there has been a 3.9 percent annual increase in the number of residences in the West End Subarea during the last five years. Therefore, this demand will likely increase the pressure on Skamania County shorelines for single-family homes, which are a preferred shoreline use provided they are developed consistent with standards that protect the environment. As in the Carson Subarea, vacant lands occur throughout the West End along the lower reaches of the lower River. Given that this portion of the County is closest to the Portland-Vancouver metropolitan area and the City of Washougal, it is likely to experience strong pressures for new residential developments and subdivisions in shoreline jurisdiction.

The Swift Subarea is located in central Skamania County along the County's western boundary. The subarea consists wholly of commercial resource and recreational lands. However, over the last 20 years, recreational development in the area has increased significantly, with visible signs of environmental degradation (Skamania County 2007c). Similar to the West End Subarea Plan, new residential growth will increase pressures on shorelines within this subarea for single-family residences in the form of vacation homes and rentals. Single-family residences are a preferred shoreline use, but they may contribute to cumulative impacts.

The SCEDC update notes that the County's proximity to the Portland-Vancouver metro area and its easy access from Interstate 84 and State Route 14, combined with recreational destinations, such as the Gorge, GPNF, and Mount St. Helens, attract millions of visitors each year. Retirement-age populations were noted as growing quickly, underscoring the demand for housing, much of which is likely to be in shoreline areas. Additionally, existing residences are often upgraded to larger, more intense uses. Therefore, according to SCEDC there is likely to be strong demand for new residences and expansions and modifications to existing residences implicating the need for detailed residential and nonconforming development regulations.

The Port's 2013 Comprehensive Scheme of Harbor Improvements contains a capital improvement program for 2013-2014. Eight projects are listed including, two of which are in shoreline jurisdiction: the Columbia River Shoreline Improvement/ Enhancement/Rock Creek Dredging and the SR 14 and Dam Access Road Intersection Improvements.

Development within the GPNF would most likely occur on lands designated by the Northwest Forest Plan as Matrix lands. Per USFS guidelines, most scheduled timber harvest takes place in Matrix, and most other silvicultural activities are conducted in portions of Matrix with suitable forest lands. Matrix lands are located throughout the County. Improvements to existing recreational facilities throughout the national forest are highly likely to occur as implemented by the National Forest Service, including to campgrounds, boat ramps, and trails.

In summary, based on a review of County plans and codes, development will continue to be focused in the sourthern portions of the County nearest the National Scenic Area and along tributary streams of the Columbia River with a special focus on vacant/underused shorelines along the Washougal and Wind Rivers. Lower density, rural residential development will likely occur on the upper reaches of the Washougal River and along creeks in the southern portion of the County, such as Duncan, Woodward, Hamilton, Greenleaf, Spring, Bear, and Panther Creeks, and along limited stretches of the Little White Salmon River. Development will be overwhelmingly residential in character with low densities exceeding 2 acres predominating, followed by developing on existing, nonconforming lots of less than 2 acres. Given the number of existing residences along the County's shorelines, expansion or modification of existing residential uses will be a frequent activity.

Outside of the southern portion of the County, development will likely be focused around Swift Reservoir (residential) and recreational, forestry, or resource (mining) uses in the large portions of the County in the National Forest. The County has very few areas of industrial or commercial uses along its shorelines, and, although, agricultural lands are common, agriculture nationwide is generally in decline and will likely convert to other uses.

5.3.3.2 Future Demand

After examining what types of development may be permitted and in what locations, an estimation of current demand for shoreline space was developed by reviewing permits issued within shoreline jurisdiction in Skamania County over a five-year period (2011-2016). **Error! Reference source not found.** below illustrates the number of permits within shoreline jurisidiction, issued by Skamania County, for specific land uses.

Table 5-2. 2011-2016 Skamania County Permit Data

Type of Permit	Number of Permits Issued Within Shoreline Jurisdiction	Approximate Average per Year
Single-Family Residential	497	99
Commercial	63	13
Multifamily Residential	39	8
Land Divisions	30	6
Shoreline Modification	19	4
Vegetation Removal and Grading	17	3
Utility	9	2
Roads	6	1
Recreation	6	1
Forest Practices	4	1
Industrial	1	<1

Error! Reference source not found. shows that there has been more single-family residential, commercial, and multifamily residential development within Skamania County's shoreline jurisdiction than any other permit types. There were also

substantial numbers of land divisions, shoreline modifications (which includes dredging, overwater structures, and ecological enhancement projects), and vegetation removal and grading (which may be associated with other development, such as single-family residential).

Vacant parcels (defined as parcels with less than $1,000 of assessed value of improvements) are likely candidates for future development and, therefore, an indicator of where development may occur in the future. County data indicate that approximately 60 percent (906 parcels) of all parcels (1,518 parcels) partially or fully within shoreline jurisdiction (including lakes and streams) are vacant. This includes parcels both within and outside of the GPNF. Of these, roughly 50 percent of the vacant parcels are designated Rural Conservancy and 30 percent are designated Shoreline Residential.

Based on Draft SMP provisions and current land use trends, the unimproved parcels in the Shoreline Residential jurisdiction will most likely be developed with single-family residences and appurtenant or accessory structures (e.g., sheds, decks, garages) and roads. Development of the unimproved parcels in Rural Conservancy will also likely favor single-family residences and appurtenant structures. Additional development will likely include forest practices, recreational development (both water- and non-water oriented), and water-related/water-dependent industrial and institutional development. Because there is already a significant amount of existing residential development along Skamania County's shorelines, there is likely to be significant demand for alterations or expansions to existing residential uses.

The likely locations for these uses, and how they may conflict with other uses, is discussed in the following sections.

5.3.4 Potential Use Conflicts

Based on the SMA and the WAC guidelines, use conflicts may occur in a number of scenarios. For example, a use conflict could occur where a given use would conflict with a given SMP provision (e.g., an industrial development that would restrict shoreline public access), or a use conflict could occur where a preferred type of shoreline development (e.g., single-family residential) conflicts with another existing or proposed use (preferred or non-preferred).

The potential for use conflicts exists within all shoreline designation zones. Because most forms of development (e.g., commercial, residential, recreational) are primarily concentrated in or near the Gorge urban areas, such as the West End, Stevenson, North Bonneville, and Carson, it is anticipated that conflict between these uses will occur in the future as they complete with each other for shorelands in those areas. Vacant shoreline parcels in the County are concentrated in the southern areas of the County, with some additional vacancies around Swift Reservoir. Conflicts in the more urbanized areas are most likely to occur related to commercial and residential

uses. Outside of urban areas and immediately surrounding lands, use conflicts would tend to be more resource-based in nature, including agricultural, forestry, and non-water-oriented recreational uses.

5.3.4.1 Identified Conflicts

Potential use conflicts that can be expected to occur throughout Skamania County, based on permitted uses (per comprehensive plans and existing regulations) and likely future demand (per County permit history). Conflicts may occur between a shoreline use and provisions of the SMP (e.g., preservation of ecological health), or between two shoreline uses (preferred or non-preferred). Per the SMA, preferred uses are consistent with the control of pollution and prevention of damage to the natural environment, or are uses that are unique to or dependent upon use of the states' shorelines (e.g., single family residences, ports, and water-dependent commercial or recreational uses).

Single-family residential: Single-family uses developed in a manner consistent with the environment in which they are located are considered to be a preferred use and are also exempt from a substantial development permit under the provisions of WAC 173-27-040. However, single-family and accessory uses (garages, sheds, etc.) not developed consistent with protection of the natural environment would conflict with shoreline recreational and ecological uses by creating water quality issues associated with runoff, removal of shoreline vegetation, and impacts to riparian functions. According to anecdotal comments offered at shoreline community visioning workshops, unauthorized expansions, repair, and vegetation removal on single-family properties is a significant issue in the County. Based on permit history, and the amount of land zoned for single-family uses in Skamania County's shoreline, it could be expected that single-family residential development and accessory uses that are not developed in a manner consistent with the standards for the protection of the natural environment, present a primary use conflict on Skamania County's shorelines. Similar recreational and ecological use conflicts may arise from incremental development, repair, and maintenance of single-family structures and accessory uses that are exempt and may not be subject to intensive review under the SMP.

Because of the high demand for new single-family uses in Skamania County, as demonstrated by permit data and dedication of land for this use in the County's codes and plans, single-family uses may also lead to conflicts with other preferred shoreline uses such boating uses, overwater structures, and shoreline access. Single-family development inconsistent with shoreline regulations may block or displace water-oriented uses, such as community docks or shoreline access, that might otherwise be required if subject to the substantial development permit review of larger residential developments. Conversely, single-family development may also lead to a predominance of individual docks or piers for each home, rather than public or community piers. In addition, public access to and along the shoreline can

be blocked or impeded by ongoing and incremental development of single-family uses. Conflicts involving single-family residential uses are most likely to occur where existing vacant parcels are located in developing areas, namely: the Swift Subarea, West End Subarea, Carson Subarea, and near Underwood.

Commercial: Commercial uses typically have larger building footprints and surface parking lots that can lead to use conflicts associated with stormwater runoff and impacts to riparian functions. The larger footprints of commercial uses requires adequate setbacks and stormwater BMPs to address water quality and vegetation removal. Non-water oriented commercial uses can also create use conflicts with water-oriented commercial uses if SMP provisions are not specific to require applicants to place non-water-oriented uses away from the water and require that applicants demonstrate that water-oriented uses aren't feasible. Major SMP regulated waterbodies which are located adjacent to commercial zones include the Wind River, Washougal River, Little White Salmon River, Columbia River, and Woody's Lake. Because commercially-zoned property in the shoreline is focused in a few areas of the County, commercial use conflicts are not anticipated to be common.

Multifamily residential: Multifamily uses have the potential to conflict with both shoreline ecological functions and other shoreline uses. Potential use conflicts with multifamily residences include creating view conflicts when located too close to shorelines for other shoreline uses because of the height and size of the building footprint. Impacts may be especially prevalent on single-family uses that are typically located adjacent to multifamily uses. Conflicts could also include impacts to shoreline functions resulting from removal of shoreline vegetation to accommodate larger building footprints and surface parking lots typical of these uses. All of the County's higher-density residential zones occur within the southern portion of the County, primarily within or near subareas. Geographically, there are concentrations of residential higher-density zones in the West End along the Washougal River, north of Woody's Lake, north of Stevenson near Rock Creek, and adjacent to the Wind River, Bear Creek, and Panther Creek near Carson and locations of potential use conflicts would be in these same areas.

Residential Land Divisions: Residential land divisions may create conflicts with shoreline ecological functions as they encourage denser development along shorelines. Land divisions may result in increased grading and vegetation removal, an increased number of septic systems, and more roads, which would likely impact the ecological functions of shorelines. Because they increase residential densities, land divisions also may lead to increased impacts on nearby shoreline recreational facilities (trails, shoreline public access, parks) as more people use the recreational facilities or access critical areas, potentially leading to degredation of these areas. Land divisions are expected to continue to be in demand in the Swift, West End, and Carson subareas; near Underwood; north of Woody's Lake; north of Stevenson near Rock Creek; adjacent to the Wind River and Bear Creek. As land divisions are

reviewed and construction occurs, the County should ensure that SMP provisions regarding clearing, vegetation removal, stormwater runoff, and septic systems are fully implemented and that adequate public and private facilities are in place to ensure that recreational facilities aren't overburdened and critical areas are accessed in appropriate areas.

Shoreline Modifications: Permits for "shoreline modifications" (which includes dredging, overwater structures, and ecological enhancement projects) are the fifth most popular type of permit in Skamania County. Modifications to the shoreline may result in conflicts related to decreased habitat, water quality, or changes to the floodplain. Examples include fill placed in floodplains, which decreases the flood capacity, or overwater structures (piers, marinas, docks, etc.), which increase overwater coverage. Piers and docks can contribute to SMA objectives by providing public access and recreational opportunities for shoreline users. However, a significant increase in water dependency may add to the extent of overwater structures, docks, bulkheads, piers, or other structures. In large concentrations, piers and docks can interfere with navigation, have adverse effects on restoration efforts, and limit the potential for other recreational uses. Areas in which large concentrations may occur include the Columbia River, Wauna Lake and environs, Swift Reservoir, and Wind River.

Dredging can disrupt substrate and ecological functions associated with fish foraging. Ecological enhancement projects do not generally result in use conflicts with other shoreline uses. Shoreline modifications can potentially occur on any shoreline property in Skamania County. However, areas of the County targeted for more intensive development, where undeveloped parcels are located (primarily the southern portions and the Swift Reservoir), and areas adjacent to open-water that can accommodate overwater structures are most likely to undergo modifications. Areas most likely for new aquatic modifications include the Wind River, Washougal River, Drano Lake, Woody's Lake, Franz Lake, and Wauna Lake.

Agricultural: Agricultural uses in the County may conflict with both SMP goals: protecting the shoreline ecology (e.g., through contribution of sediments and nutrients to water bodies) and avoiding conflicts with adjacent uses (e.g., noise, odors, and the hours of operation uses may conflict with residential and commercial uses). Agriculture in the County are primarily located in the West End Subarea and in the southeast corner of the County. There are two areas in particular where use conflicts may be most prevalent. Currently, portions of the Washougal River and the White Salmon River are zoned agricultural and would allow uses that directly conflict with SMA preferred uses.

Forest Practices: Forest resources, namely the GPNF, cover a majority of the County to the north. The Forest Practices Act (RCW 76.09) and the SMA may conflict in their provisions, such as specified buffers. The SMP would apply to non-harvest uses,

such as roads, stream crossings, and accessory forestry buildings, and to the conversion of land from forestry uses to another use. Other conflicting shoreline uses within forest lands, under limited circumstances, may include grazing, mineral extraction, hydroelectric, and surface water development proposals. Forest practices may conflict with SMA goals as poorly functioning forestry roads will contribute fine sediments to riverine aquatic environments, and landslides associated with these roads and road failure due to channel migration is also possible. Forest uses may also conflict with adjacent uses, such as single-family dwellings and water-oriented recreational uses. Forest uses are expected to continue to occur in the Swift, West End, and Carson subareas, and in east Skamania County

Utilities and Transportation Infrastructure: Some utilities will need to be located in shoreline areas, such as pumping facilities. Others, such as sanitary sewers, may impact shoreline areas through outfalls and discharges. These uses may negatively impact shoreline vegetation and water quality, increase erosion, and degrade the quality of habitat. Transportation facilities, in particular roads, increase impervious surfaces and stormwater runoff in shoreline areas and are often armored along shorelines as is the case with State Route 14 along many areas of the Columbia River in Skamania County. Infrastructure may also increase the development pressure in a given area, as development is more likely to occur where infrastructure is already in place. Infrastructure and utilities will follow the demand for other land uses, and can be anticipated along the Columbia River, Hamilton Creek, Franz Lake, Wind River, Little Wind River, Little White Salmon River, and White Salmon River, and throughout urbanized areas.

Public Recreation: As part of its county-wide planning process, Skamania County has developed a Parks and Recreation Master Plan (updated in 2016). The 2016 plan focuses on maintaining and improving existing recreational facilities, rather than developing new facilities. Public recreation zones are concentrated near two of the subareas, West End and Carson. Recreational facilities, especially on the shoreline, can be in high demand and it is imperative that the County require that adequate parking and other facilities (e.g.) restrooms be provided with these facilities so that impacts can be better contained on the sites in questions. The Wind River boat launch, for instance, has insufficient parking and site users regularly park on the access road leading to the site creating safety issues. Like other types of shoreline development, recreational facilities can lead to riparian impacts as vegetation is removed to accommodate the use and runoff from parking lots is not adequately controlled. Non-water-oriented shoreline facilities (golf courses, sports fields, etc.) can conflict with the provision of water-oriented uses such as boat launches and public piers. Use conflicts, primarily resource uses such as mining, agriculture, and forestry, may occur on the Columbia River, Hamilton Creek, Wind River, and Drano Lake where this zone is concentrated.

Flood Management: Conflicts between flood management measures, such as levees, exist as they prevent flood damage to structures and uses, but also impair the ecological balance of a shoreline and may even reduce flood capacity downstream. A Flood management structures may alter the floodplain and reduce fish habitat and water quality. These conflicts will occur anywhere dams or levees are located, such as Swift Reservoir, Woody's Lake, and the Washougal River or where such measures are proposed in the future.

Mining and Gravel Extraction: Resource extraction, such as mining and gravel, is generally in conlict with the provisions of the SMA as it tends to impact shoreline ecology. Operations are frequently located near rivers and urban areas, and can lead to clearing and vegetation removal, sediment input to freshwater bodies, and impaired water quality. Mining within floodplains can alter channel morphology and decrease habitat functions. Per the DNR, there are currently 9 active surface mines permitted in the county, located near the southern border of the County and generally adjacent to urban areas, notably along the Middle and West Fork of the Washougal River, between Bonneville and Stevenson, and near Carson.

5.3.5 Policy Considerations

Based on the use conflicts in the land use analysis, the following policy considerations for the draft Skamania County SMP were created to guide future development in a manner which is consistent with the SMA and SMP Guidelines:

- ***Residential uses (Single-family, multifamily, and land divisions):*** Due to the anticipated demand for single-family uses based on permitting history and a predominance of single-family residential zoned land, and ongoing development of single-family homes and accessory structures in the West End, Swift, and Carson, as well as Columbia River tributaries creeks and rivers in south County where residential uses predominate, the SMP needs to carefully consider setback, vegetation conservation, and public access provisions that will protect shoreline functions and access. The County may want to consider a consolidated public access plan to preserve existing access and plan for new access points. The SMP provisions should also address the predominance of individual docks and piers and associated ecological impacts that may result from single-family uses and should promote community/public piers.

  Similar to single-family residences, multifamily should consider the impacts of development of these uses on from vegetation removal and associated ecological functions. Because these uses have larger building and development footprints and are not a preferred shoreline use, they should be setback further to alleviate these impacts. View impacts may result from taller and larger multifamily structures which setbacks and height limits can help alleviate.

Land divisions can create similar conflicts as do development of individual single-family homes, but on a larger scale including grading, filling, clearing of shoreline areas, installation of septic systems, water quality impacts from vegetation removal and stormwater runoff, blocking or impeding public access, and a predominance of overwater structures. The SMP should establish adequate setbacks and vegetation conservation provisions, and require community public access points and piers and docks, rather than individual facilities.

- ***Commercial uses:*** Commercial uses have larger development and building footprints than most uses and should have adequate setbacks, stormwater requirements, and vegetation provisions to address associated ecological impacts. Where commercial is permitted, the SMP should require that water-dependent/oriented uses be prioritized so that non-water-oriented commercial does not compete for limited shoreline commercial space.

- ***Agricultural uses:*** Currently, portions of Franz Lake and the White Salmon River are zoned agricultural and allow uses that directly conflict with SMA preferred uses. The SMP should either prohibit new agricultural use within shoreline jurisdiction or include development standards which protect shoreline ecological functions and promote access to the shorelines.

- ***Shoreline modifications:*** The SMP should contain adequate provisions to mitigate for the impacts of shoreline modifications including for dredging and overwater strutures. Since these uses typically occur in the water or at the water's edge, their ecological conflicts can be more pronounced.

- ***Forest uses:*** It will be important for the SMP to allow for ongoing forestry uses within shorelines, while crafting regulatory language that promotes water-dependent forestry and recreational uses next to the water such as log storage and trails, where necessary and compatible.

- ***Utilities:*** The SMP needs to allow for utility facilities, require that they be placed underground, with a preference for water-dependent utilities (outfalls) along the shoreline over other types of utilities and an alternatives analysis for primary utility facilities in shoreline jurisdiction.

- ***Roads:*** The SMP needs to allow for roads (and associated transportation infrastructure) in shoreline areas. To offset impacts, provisions should include minimizing shoreline disruption by placing roads outside the shoreline, where feasible or placing the road perpendicular to the shoreline, and mitigation of impacts including stormwater runoff and vegetation removal.

- ***Mining and gravel extraction:*** The SMP should accommodate existing mining and gravel extraction operations, while ensuring that new or expanded

operations minimize their disruption of shoreline ecology. Policies should encourage that mining or gravel extraction occur within shoreline areas only when necessary (due to resources or other economic factors), and prioritize operations that involve restoration or enhancement projects.

- ***Recreation:*** The SMP should prioritize water-oriented recreational uses, and limit the ability of non-water-oriented recreational uses to locate in shorelines. Provisions should also encourage increased public access in the County, such as promoting the inclusion of public recreation as a feature of other shoreline uses (such as commercial).

- ***Flood management:*** The SMP should promote alternative (non-structural) approaches to typical floodplain management structures such as dams. Demonstration of need for structal flood reduction measures should be through a geotechnical analysis in compliance with the WAC 173-26-221. Where necessary, management structures sould be located and designed in full consideration of their impacts to floodplain and shoreline ecology including locating them landward of wetlands and shoreline vegetation, where feasible.

5.4 Public Access Opportunities

Providing visual and physical public access to public shorelines is one of the central tenets of the SMA; SMPs do not authorize trespass on private property. The guidelines require SMPs to implement public access with site-specific development with only a few exceptions, including when it is unsafe to do so, when access would impact the shoreline environment, in cases of residential development of four units or less, and when requiring public access would not meet constitutional limitations.

Appendix A contains Map 11 titled "Shoreline Modification, Bridges, Dams, Trails, and Public Access" showing existing public access in relation to County shorelines. In general, residents and visitors to Skamania County enjoy excellent public access to County shorelines because most are located in the Forest, which contains USFS roads and trails that provide views and/or direct contact with many, if not most, shoreline waterbodies on USFS lands. There are a total of 42.3 miles of trails and 106.5 miles of roads within shoreline jurisdiction in the County. These trails and roads provide direct physical or visual access to the following shoreline waterbodies:

- ***Lakes:*** Deadman's Lake, Shovel Lake, Panhandle Lake, Spirit Lake, Mosquito Meadows, Wright Meadow, Spencer Meadow, Cedar Flats, McClellan Meadows, Placid Lake, Big Mosquito Lake, Swampy Meadows, Unamed (Lower Trout Lake Creek HUC), Taklakh Lake, Council Lake, Horseshoe Lake, Midway Meadows, Unamed 1-3 (Chambers Creek-Cispus River HUC), and Swift Reservoir.
- ***Rivers and streams:*** Green River, Coldwater Creek, Spirit Lake Outflow, Sasquatch Steps, Dryer Glacier, Muddy River, Smith Creek, Nelson Glacier, Marble Creek, Swift Creek, Worm Flows, Glacial Runoff Unamed (Cougar

Creek-Lewis River HUC), Siouxon Creek, Chinook Creek, Hardtime Creek, Meadow Creek, Big Creek, Lewis River, Quartz Creek, Snagtooth Creek, French Creek, Dark Creek, McCoy Creek, East Canyon Creek, Cispus River, Cispus River Muddy River F2, Cispus River Muddy F2, Cat Creek, Spring Creek, Adams Creek, Killen Creek, Boulder Creek, Big Spring Creek, Cascade Creek, Morrison Creek, Buck Creek, White Salmon River, Little Goose Creek, Cultus Creek, Mosquito Creek, Hole in the Ground Creek, Trapper Creek, Big Hollow Creek, Falls Creek, Little White Salmon River, White Salmon River, Drano Lake, Panther Creek, Cedar Creek, Trout Creek, Rock Creek, Greenleaf Creek, Woodward Creek, Columbia River, Copper Creek, Puny Creek, Canyon Creek, Sorehead Creek, and Duncan Creek

The National Forest Service manages many of the access points along trails in the GPNF. The National Forest has a Trail System Plan that classifies trails into different types, many of which provide access to shorelines: Wilderness Trails, Pacific Crest National Scenic Trail, Non-Wilderness Trails, High-Clearance Routes, Off-Road Vehicle Trails, Nation Recreation Trails and National Historic Trails, and Winter Recreation. According to the GPNF Land and Resource Management Plan, there are 1,068 miles of trails within the National Forest. Backpacking along trails is subject to seasonal restrictions and a Northwest Forest Permit is required. A complete list of day hiking, backpacking, and winter sports trail opportunities are provided on the Gifford Pinchot National Forest website.

Water activities, including swimming and boating, are also available in the National Forest. Designated swimming, motorized and non-motorized boating activities are available at Walupt Lake and Mosquito Lake and in the Mount Adams area. Fishing on streams and rivers on the National Forest is managed by a license system through the Washington Department of Fish and Wildlife.

That said, across the 1,400 miles of shoreline in the County, there are only six boat ramps providing formalized boat access to County shorelines, four of which are in south County near the Columbia River, one on Swift Reservoir, and one on Walupt Lake in the National Forest. In addition, one of these boat ramps is located within the City of Stevenson. As such, there is a general void of boat access points across the County that allow water-enjoyment boating activities.

Existing public access resources that are safe and effective should be protected and maintained. The ability to provide new or enhanced public access depends on many factors – land ownership, topography, and jurisdictional budgets, to name just a few. The following analysis assessed public access opportunities in the County by identifying shoreline waterbodies where existing access is not present. The analysis depends on the available data regarding the location of trails, roads, boat accesses, and parks and land under public ownership and does not take into account informal access points or view access because information for these locations is lacking.

As an initial step in identifying where new public access may be needed, the following Table 5-3 identifies shoreline areas where public access is not present. The table is limited to lands under public ownership. As barriers to providing public access are identified and public access opportunities are prioritized, the County can refine this information in coordination with the USFS and other agencies to focus on the areas where access is most needed and desired by residents and visitors, giving consideration to budget and other constraints.

Table 5-3. Preliminary Shoreline Public Access Opportunity Areas

12-Unit HUC Number and Reach Name	Shoreline Waterbody Lacking Access	Comment
WRIA 26 Cowlitz		
170800040401 McCoy Creek	McCoy Creek	Potential trail opportunity
170800040402 Yellowjacket Creek	Yellowjacket Creek	Potential trail opportunity
170800050402 Upper Green River	Miners Creek, Elk Lake, Hanaford Lake	Potential trail opportunities
170800050401 Headwaters Green River	Venus Lake	Potential trail opportunity
170800050502 Headwaters North Fork Toutle River	Studebaker Creek, Toutle River N.F.	Potential trail opportunities
170800040303 Muddy Fork Cispus River	Unnamed Lake (Southern part of HUC)	Potential trail opportunities
170800040304 Chambers Creek-Cispus River	Cispus River 1 and Unnamed Associated Lake	Potential trail opportunities
WRIA 27 Lewis		
170800020101 Boulder Creek-Lewis River	Boulder Creek	Potential trail opportunity
170800020102 Swampy Creek	Swampy Creek 1, Unnamed Lake (northern part of HUC)	Potential trail opportunities
170800020103 Twin Falls Creek-Lewis River	Pin Creek, Twin Falls Creek	Potential trail opportunities
170800020105 Quartz Creek	Straight Creek, Snagtooth Creek	Potential trail opportunities
170800020106 Tillicum Creek-Lewis River	Tillicum Creek, Unnamed Lake (southern part of HUC)	Potential trail opportunities
170800020107 Big Creek	Big Creek	Potential trail opportunity
170800020108 Cussed Hollow-Lewis River	Cussed Hollow, Alec Creek	Potential trail opportunities
170800020109 Rush Creek	Rush Creek 2	Potential trail opportunity
170800020111 Little Creek-Lewis River	Pepper Creek	Potential trail opportunity
170800020201 Upper Muddy River	Ape Canyon, Nelson Glacier	Potential trail opportunities
170800020202 Clearwater Creek	Clearwater Creek 1 & 2, Bean Creek	Potential trail opportunities
170800020204 Lower Clear Creek	Clear Creek, Wright Creek	Potential trail opportunities
170800020205 Lower Muddy River	Muddy River 3, Muddy River UT	Potential trail opportunities

12-Unit HUC Number and Reach Name	Shoreline Waterbody Lacking Access	Comment
170800020205 Lower Muddy River	Muddy River 5	Potential trail opportunity
170800020301 Pine Creek	Pine Creek 1, 2, 3, & 4, Pine Creek UT 1, 2, & 3	Potential trail opportunities
170800020303 Drift Creek	Drift Creek	Potential trail opportunity with easements across privately owned reaches of the creek
170800020304 Swift Creek	Swift Creek, Swift Creek 1, 2, & 3, Swift Creek UT, Worm Flows	Potential trail opportunities
170800020305 Lower Swift Reservoir	Swift Reservoir	Much of south side is under public ownership with no trails or boat launches present to the reservoir. Potential trail opportunity to Range Creek.
170800020401 Cougar Creek-Lewis River	Glacial runoff unnamed	Potential trail opportunity
170800020402 Upper Sioxon Creek	Calamity Creek	Potential trail opportunity
170800020403 North Siouxon Creek	North Siouxon Creek	Potential trail opportunity
170800020404 Lower Sioxon Creek	Siouxon Creek UT, Sioxon Creek 6, West Creek	Potential trail opportunities
170800020502 Slide Creek-East Fork Lewis River	Slide Creek, Little Creek	Potential trail opportunities
170800020601 Upper Canyon Creek	Jakes Creek	Potential trail opportunity
170800020603 Lower Canyon Creek	Big Rock Creek	Potential trail opportunity
WRIA 28 Salmon-Washougal		
170800010601 Headwaters Washougal River	Washougal River 1, 2, & 3, Look Out Creek, Bluebird Creek	Potential trail opportunities
170800010602 Upper Washougal River	Stebbins Creek	Potential trail opportunities
170800010603 West Fork Washougal River	Wildboy Creek, Washougal River West Fork 1, 2	Potential trail opportunities
170800010801 Tanner Creek-Columbia River	Hamilton Creek 1, Wuana Lake, Columbia River 12-15	Potential trail opportunities, opportunities for boat/kayak launches
170800010802 Hamilton Creek-Columbia River	Columbia River 16-19, Franz Lake	Potential trail and boat/kayak launch opportunities

12-Unit HUC Number and Reach Name	Shoreline Waterbody Lacking Access	Comment
170800010803 Viento Creek-Columbia River	Columbia River 20-22	Potential trail and boat/kayak launch opportunities
170800010804 Latourell Creek-Columbia River	Columbia River 23	Potential trail and boat/kayak launch opportunities
WRIA 29 Wind-White Salmon		
170701050801 Headwaters White Salmon River	Cascade Creek 1, Cascade Creek UT, Salt Creek	Potential trail opportunities
170701050804 Upper Trout Lake Creek	Trout Lake Creek 1, Grand Meadows	Potential trail opportunities
170701050804 Upper Trout Lake Creek	Trout Lake Creek 1 and 2, Cultus Creek 1	Potential trail opportunities
170701050811 North Weston Lake-White Salmon River	Columbia River 1-3	Potential trail, boat/kayak launch opportunities
170701050901 Dry Creek-Lost Creek	Dry Creek, Lost Creek 1 & 2, Forlorn Lakes	Potential trail opportunities
170701050902 Lava Creek	Lava Creek, Goose Lake Outlet	Potential trail opportunities
170701051002 Falls Creek	Black Creek	Potential trail opportunity
170701051006 Panther Creek	Cedar Creek, Eightmile Creek	Potential trail opportunities
170701051007 Bear Creek	Bear Creek 1, Bear Creek UT	Potential trail opportunities
170701051008 Little Wind-River-Wind River	Little Wind River	Potential trail opportunity
170701051106 Grays Creek-Columbia River	Columbia River 4-6	Potential trail, boat/kayak launch opportunities
170701051202 Rock Creek	Forest Creek	Potential trail opportunities
170701051204 Carson Creek-Columbia River	Columbia River 9	Potential trail, boat/kayak launch opportunities

6.0 DATA GAPS

This section of the report identifies gaps in data; addressing these gaps would be useful for future Skamania County shoreline planning. Data gaps may include missing, outdated, or poor quality information that limited the assessment of shoreline processes, functions, alterations, restoration opportunities, and the reach analysis. Table 6-1 lists the data gaps, the sources that were investigated, and comments.

Table 6-1. Skamania County Data Gaps

Data Gap	Sources Investigated	Date	Additional Comments
Channel Migration Zones	• County • Ecology	5/7/2015	Data was developed for Western Washington only; covers 3 WRIAs but does not cover WRIA 29.
Critical Aquifer Recharge Areas	• Ecology	5/7/2015	Not available.
Dredged Areas	• DNR • USACE Geospatial Information Portal	5/7/2015	Not available.
Erosion Hazard Areas	• NRCS SSURGO database	5/7/2015	Data does not correspond to the specific soil types that are erosion hazards.
Frequently Flooded Areas	• FEMA	5/7/2015	FEMA data for WRIA 26 is not available.
Floodway	• FEMA • County • Ecology	3/27/2015	Not available.
In-Water Features	• County • DNR • WDFW • USGS	6/16/2015	Information on channel width, water depth, bathymetry, existing use and development activities not available; percent gradient, general geomorphology, and riparian topography at the reach scale is not available.
Land Use and Altered Conditions	• County • WDFW • DNR • Aerial Photography	6/16/2015	Information for bulkheads, pile dikes, levees, and culverts is not available.
Landslide Hazards	• DNR	5/7/2015	Partial county coverage is available with 24K scale data; full county coverage available with the less detailed 100K scale data; coverage was merged and displayed as "best available."
Liquefaction, Seismic Hazards	• USGS • DNR	5/7/2015	Not available.
Mudflow Risk	• USGS	5/7/2015	Not available.
Planned Land Use	• County	5/7/2015	Not available. County does not have a future land use map.
Potential Restoration Actions	• Project Information (PRISM)	5/7/2015	No data found.

Data Gap	Sources Investigated	Date	Additional Comments
	• Habitat Working Schedule (HWS)		
Public Access	• County • WSDOT • USFS	6/16/2015	No data found for views from roadway, roadside pull-outs/viewpoints, trails/ trailheads, on-site facilities/amenities (restrooms, trash cans, benches, picnic tables/shelter, interpretive signs), etc.
Seismic Hazards	• DNR	5/7/2015	Not available.
Water-Oriented Use	• County Assessor	5/7/2015	Not available.
Water Quality	• Ecology	5/16/2015	Most recent data is from 2012. Water quality concerns (Category 4 or 5) (turbidity, total dissolved solids, and chemical contaminants) not listed on Ecology's 303d list for water bodies in Skamania County.
Volcanic Hazards	• DNR	5/7/2015	Not available.
Wastewater System	• County	5/17/2015	Not available.

7.0 SOURCES

Compiling the inventory and characterization report for Skamania County involved reviewing many data sources and technical reports developed by the County, state and federal agencies, and watershed groups as well as other scientific literature. The information was used to characterize watershed and Columbia River nearshore conditions, and to assess the ecological functions of Skamania County shorelines in an ecosystem-wide context. A draft list of resources follows; a complete list will be furnished with the final version of the report.

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