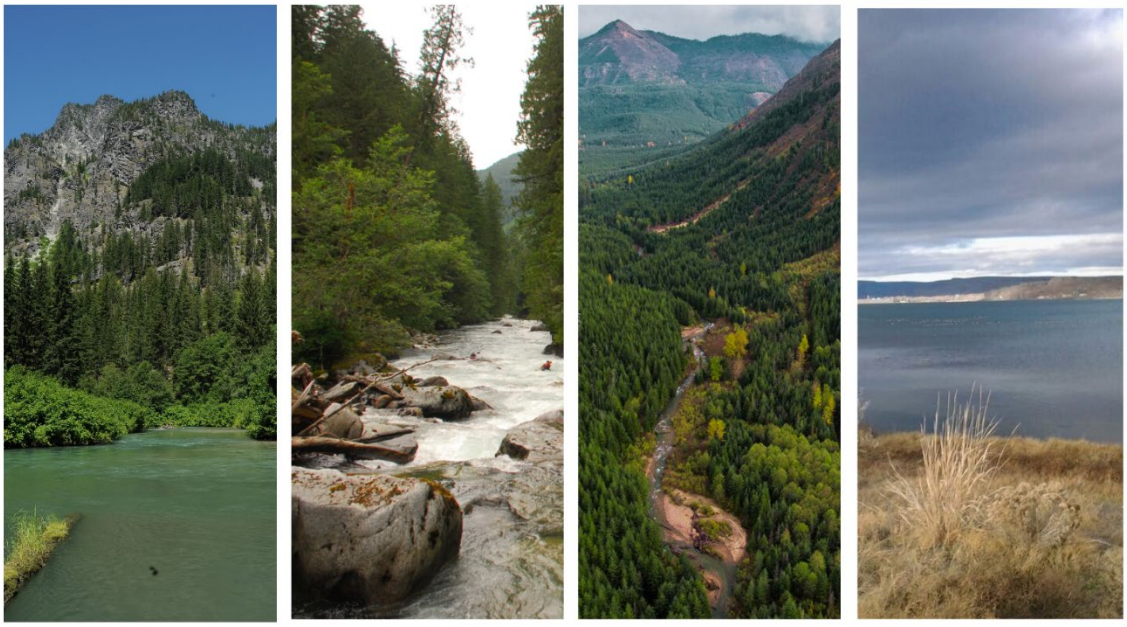

Adopted Outstanding Resource Waters Designations for Soap Lake and Portions of the Cascade, Napeequa, and Green Rivers

Technical Support Document

By

Water Quality Program

Washington State Department of Ecology

Olympia, Washington

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- Implementation Plan for Outstanding Resource Waters, Publication 23-10-045
- Concise Explanatory Statement, Publication 23-10-047
- Final Regulatory Analyses, Publication 23-10-048

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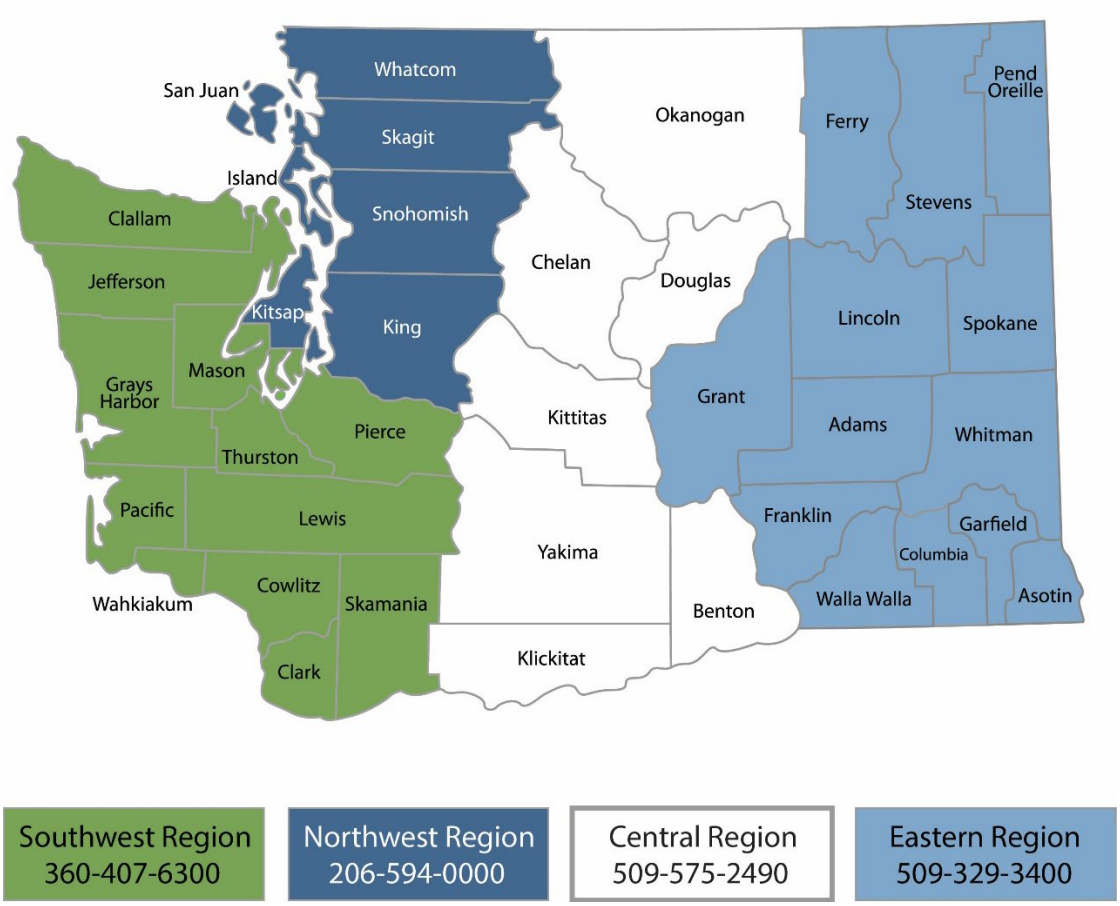

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Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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- Soap Lake Conservancy
- Confederated Tribe of the Colville Reservation

For the Cascade, Napeequa, and Green Rivers, we are grateful to:

- The Pew Charitable Trusts
- American Rivers
- Cascade Forest Conservancy
- Wild Salmon Center
- American Whitewater
- Washington Wild
- Trout Unlimited

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- US Bureau of Reclamation
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- Kristi Floyd and Will Hobbs, Ecology Environmental Assessment Program

Executive Summary

On August 30, 2022, Ecology began a rulemaking to consider designating four waterbodies as outstanding resource waters. This rulemaking is in response to nominations we received in 2021. This rule was adopted on December 19, 2023.

Outstanding resource waters are identified as having exceptional water quality, ecological and recreational values, or unique attributes that distinguish them among state waterbodies and warrant special protection. Outstanding resource waters can be designated as a Tier III(A) or Tier III(B) water under WAC 173-201A-330. Tier III(A) prohibits any and all degradation after an outstanding resource water designation is adopted, and Tier III(B) allows only minor degradation under certain conditions.

Ecology designated the following waterbodies as **Tier III(A) outstanding resource waters**:

- The upper watershed of the Cascade River and tributaries (Skagit County)
- Portions of the Napeequa River and tributaries (Chelan County)
- The upper watershed of the Green River and tributaries (Skamania County)

These rivers were nominated in 2021[2] by the Pew Charitable Trusts, American Rivers, Cascade Forest Conservancy, Wild Salmon Center, American Whitewater, Washington Wild, and Trout Unlimited.

Ecology designated the following waterbody as **Tier III(B) outstanding resource waters**:

- Soap Lake (Grant County)

Soap Lake was nominated in 2021[3] by the Soap Lake Conservancy and the Confederated Tribe of the Colville Reservation.

Each waterbody we adopted as an outstanding resource water meets one or more of the eligibility criteria listed under WAC 173-201A-330(1). These waters are recognized for their exceptional values to the state.

The three rivers are recognized for their relatively pristine condition, ecological significance, and recreational values including boating, hiking, and horseback riding.

Soap Lake is recognized for its unique alkaline and saline water and is among a rare class of lakes called meromictic lakes. The unique conditions of Soap Lake also contribute to its recreational and tribal value.

This is the first time Ecology has adopted outstanding resource water designations for waterbodies in Washington.

[2] https://fortress.wa.gov/ecy/ezshare/wq/standards/ORW_Nomination_3Rivers.pdf
[3] https://fortress.wa.gov/ecy/ezshare/wq/standards/SoapLakeORW_Nomination.pdf

Introduction

The purpose of this document is to provide supporting information for the rulemaking to adopt outstanding resource waters under chapter 173-201A Washington Administrative Code (WAC), Water Quality Standards for Surface Waters of the State of Washington (Standards). Outstanding resource waters are identified as having exceptional water quality, ecological and recreational values, or unique attributes that distinguish them among state waterbodies and warrant special protection. The Standards include a process for nominating exceptional waterbodies to consider for this designation. To date, Washington has not designated any waterbody as an outstanding resource water. This rule is in response to nominations of four waterbodies and includes consideration of public comment received during the rule proposal to designate them as outstanding resource waters.

Outstanding resource waters can be designated as a Tier III(A) or Tier III(B) water under WAC 173-201A-330. Tier III(A) prohibits any and all future degradation, and Tier III(B) allows only minor degradation under certain conditions.

Nominations

Soap Lake nomination

On April 2, 2021, the Soap Lake Conservancy and the Confederated Tribes of the Colville Reservation submitted a nomination[4] to designate Soap Lake as a Tier III(B) outstanding resource water. Ecology reviewed the waterbody to determine if it met one or more of the eligibility requirements under WAC 173-201A-330(1). During this review, we contacted tribes in the geographic vicinity of the lake, as well as local jurisdictions and other stakeholders to notify them of the nomination.

On June 1, 2021, Ecology notified the proponents[5] that the nomination demonstrated that Soap Lake met one or more of the eligibility criteria under WAC 173-201A-330(1).

Cascade River, Napeequa River, and Green River nominations

On June 24, 2021, the Pew Charitable Trusts, American Rivers, Cascade Forest Conservancy, Wild Salmon Center, American Whitewater, Washington Wild, and Trout Unlimited submitted nominations[6] to designate portions of the Cascade River, portions of the Napeequa River, and portions of the Green River, and tributaries, as outstanding resource waters. Each river was nominated for Tier III(A) protection. During this eligibility review, we contacted tribes in the geographic vicinity of each nominated waterbody, as well as local jurisdictions and other stakeholders to notify them of the nominations.

[4] https://fortress.wa.gov/ecy/ezshare/wq/standards/SoapLakeORW_Nomination.pdf
[5] https://ecology.wa.gov/Asset-Collections/Doc-Assets/Water-quality/WQ-Standards/SoapLakeOustandingWaterLetter
[6] https://fortress.wa.gov/ecy/ezshare/wq/standards/ORW_Nomination_3Rivers.pdf

On August 18, 2021, Ecology notified the proponents[7] that the nominations demonstrated that each river met one or more of the eligibility criteria under WAC 173-201A-330(1).

On November 14, 2022, the proponents requested to modify the boundary[8] of the Green River nomination to exclude portions of the river that flow through privately-owned land.

Public feedback during the 2021 Triennial Review

The U.S. Environmental Protection Agency (EPA) requires states to perform regular public reviews of their surface water quality standards called a Triennial Review. During Washington's 2021 Triennial Review, we received comment on behalf of 50 organizations[9] in support of Ecology prioritizing a public review of the outstanding resource water nominations received in 2021.

Rulemaking process and timeline

On August 30, 2022, Ecology filed a preproposal statement of inquiry (CR-101 Form) to notify the public that we started a rulemaking to consider designating the four nominated waterbodies as outstanding resource waters. Ecology's Water Quality Program then began gathering additional information on each nominated waterbody. During this time, we met with entities and jurisdictions in the area of the nominated waters including tribes, the U.S. Forest Service, National Parks Service, the Bureau of Reclamation, and Quincy-Columbia Basin Irrigation District to discuss management priorities and implementation strategies to protect the high water quality and values of the waterbodies. We met with local officials, including the Soap Lake City Council, the Skagit County Commissioners, the Skamania County Commissioners, the Grant County Commissioners, and the Chelan County Natural Resources Director to discuss implementation questions and concerns for this rulemaking.

Ecology held public webinars on November 16 and 17, 2022, to provide background on the rulemaking, gather implementation questions, and provide information on how to participate in the rulemaking.

On July 18, 2023, Ecology proposed outstanding resource water designations for public comment. Ecology accepted comment on the proposed designations until September 27, 2023. During the public comment period, we held public hearings at the following dates and times:

- Sept. 7, 5:30 p.m. (Online hearing via Zoom)
- Sept. 12, 2 p.m. (Cowlitz County)
- Sept. 14, 2 p.m. (Skagit County)
- Sept. 19, 5:30 p.m. (Soap Lake)
- Sept. 20, 2 p.m. (Leavenworth)

[7] https://fortress.wa.gov/ecy/ezshare/wq/standards/ORWResponse_CascadeGreenNapeequa.pdf
[8] https://fortress.wa.gov/ecy/ezshare/wq/standards/ORW_GreenRiverBoundaryModification.pdf
[9] https://apps.ecology.wa.gov/publications/documents/2210002.pdf

A final rule package recommending adoption of these ORWs was submitted by staff to Ecology's Director, Laura Watson, and the rule was formally adopted on December 18, 2023. Other supporting documents for this rule adoption are listed below.

- Concise Explanatory Statement, Ecology Publication 23-10-047[10]
- Rule Implementation Plan, Ecology Publication 23-10-045[11]
- Final Regulatory Analyses, Ecology Publication 23-10-048[12]

[10] https://apps.ecology.wa.gov/publications/summarypages/2310047.html
[11] https://apps.ecology.wa.gov/publications/summarypages/2310045.html
[12] https://apps.ecology.wa.gov/publications/summarypages/2310048.html

Background on Outstanding Resource Waters

Water quality standards

Under Section 303(c) of the Clean Water Act (CWA) and federal implementing regulations at 40 Code of Federal Regulations (CFR) § 131.4, states and authorized tribes have the primary responsibility for reviewing, establishing, and revising water quality standards. Water quality standards set limits on pollution in lakes, rivers, and marine waters to protect designated uses, or goals, for a waterbody. Water quality standards have three main parts: designated uses, water quality criteria, and antidegradation. Outstanding resource waters are designated under the state antidegradation policy.

Antidegradation policy

The main objective of the CWA is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (33 U.S.C. § 1251(a)). To protect and maintain water quality that has already been achieved, states are required to develop and adopt a statewide antidegradation policy consistent with 40 CFR § 131.12. These regulations require that such a policy should, at minimum, be consistent with the following provision for protecting outstanding resource waters (131.12(a)(3)):

> "Where high quality waters constitute an outstanding national resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected."

Ecology updated our antidegradation policy in 2003 to be consistent with the federal requirements to protect outstanding resource waters.

Our antidegradation policy sets protections for waterbodies under three levels, or tiers. These three tiers make up our antidegradation rules.

Tier I protects all existing and designated uses for all waterbodies in Washington. We protect existing and designated uses by establishing water quality criteria and using water cleanup plans to correct pollution problems.

Tier II applies to waterbodies that have higher quality water than limits set by water quality standards. Tier II protects these waterbodies from degradation but allows degradation if a discharger can demonstrate it is 1) in the overriding public interest to degrade the water, and 2) after the discharger identifies and applies feasible alternatives to degrading water quality.

Tier III is the highest level of protection for a waterbody and designates outstanding resource waters. A Tier III waterbody can be designated as Tier III(A), which prohibits any and all future degradation, and Tier III(B), which allows only minor degradation under certain conditions.

Eligible outstanding resource waters

To be eligible for consideration as an outstanding resource water in Washington, a waterbody must meet one or more of the following eligibility criteria listed under WAC 173-201A-330(1):

- Relatively pristine (largely absent from human degradation) or possessing exceptional water quality and in a protected area such as a state or federal park, monument, preserve, wilderness area, or wild and scenic river designation;
- Unique aquatic habitat types that are not considered high water quality by conventional standards, such as dissolved oxygen, temperature, or sediment, but are unique and regionally rare;
- High water quality and regionally unique recreational value;
- Exceptional statewide ecological significance; or
- Cold water thermal refuges critical to the protection of aquatic life.

Outstanding resource water nomination and designation process

Washington State's antidegradation policy allows anyone to nominate a waterbody or portion of a waterbody as an outstanding resource water. A nomination must be submitted in writing and provide sufficient information to show how the waterbody meets at least one of the eligibility criteria. Ecology then has 60 days after receiving a nomination to determine if the information submitted meets the eligibility criteria. During this time, Ecology notifies tribes, local jurisdictions, and other stakeholders of the nomination.

If Ecology determines that the waterbody is eligible, we schedule a review of the nominated water for designation as an outstanding resource water. The review includes a public process and consultation with tribes. During the eligibility review, we gathered information on how a nominated waterbody may meet our eligibility criteria. We also discussed implementation questions and concerns with affected landowners, local jurisdictions, other agencies, and Tribal governments.

To determine whether to designate an outstanding resource water, we considered factors relating to the difficulty of maintaining the current quality of the water body. Outstanding resource waters should not be designated where substantial and imminent social or economic impact to the local community will occur, unless local public support is overwhelmingly in favor of the designation. We carefully weighed the level of support from the public and affected governments in assessing whether to designate the water as an outstanding resource water.

The next sections of the document provide information on each ORW designated waterbody and how they meet the eligibility criteria for establishing these designations in the surface water quality standards (Chapter 173-201A WAC).

Review of Soap Lake for ORW Designation

Geography and history

Soap Lake, in Grant County and Water Resources Inventory Area (WRIA) 42 – Grand Coulee Watershed, is located on unceded tribal land[13] of the Confederated Tribes of the Colville Reservation, within the traditional territory of the Moses-Columbia Tribe (Confederated Tribes of the Colville Reservation, 2021). The city of Soap Lake, with a population of nearly 1,700, sits at the southern end of the lake. Outside the city limits, the shoreline is largely undeveloped, with steep bedrock outcroppings flanking the east and west banks.

Soap Lake was originally called Smokiam, which refers to the "healing waters" of the lake. Soap Lake gets its name from the soapy feeling of the water and foam that used to appear on the lake shore caused by the minerals in the water.

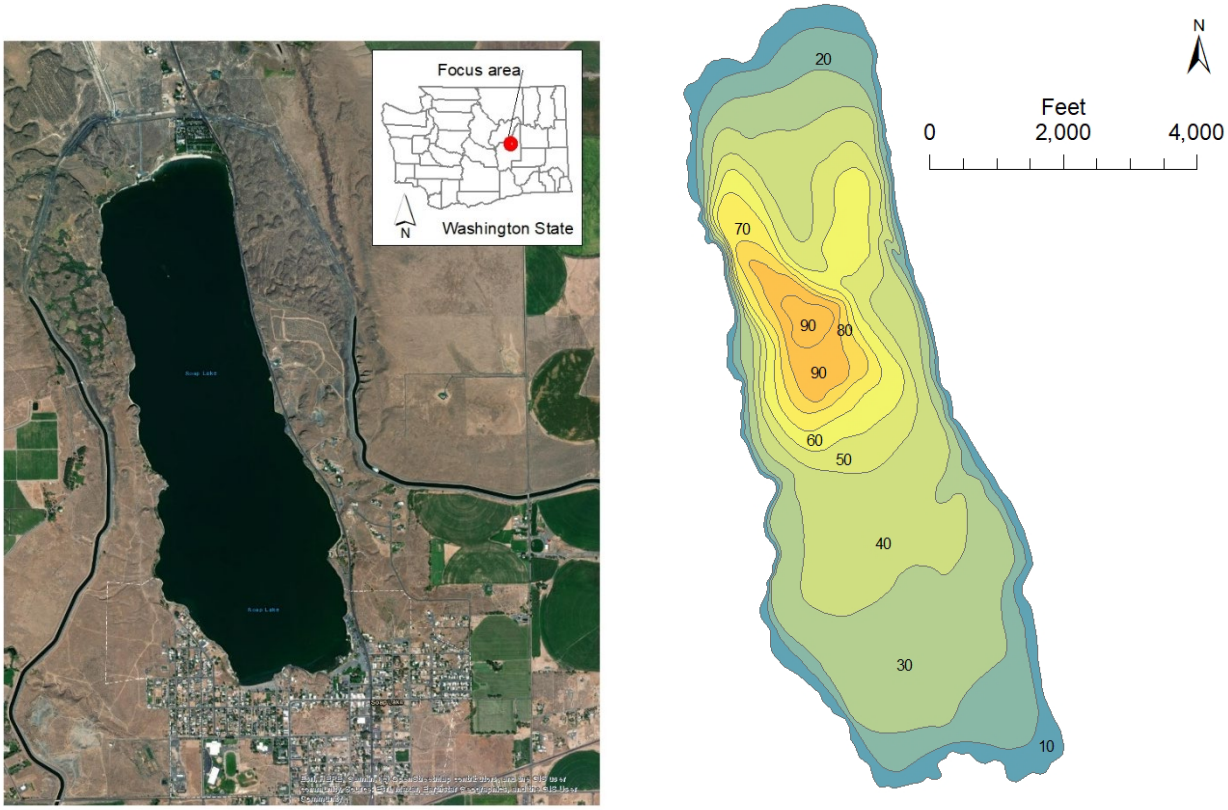

Figure 1 Aerial image (left) and depth profile (right) of Soap Lake

Soap Lake is a highly saline, alkaline lake. Covering approximately 860 acres, it has a maximum depth of 95 feet and length of 2.2 miles (Figure 1). It is the southernmost lake of the Sun Lakes, a series of lakes that begin at the foot of Dry Falls in the Lower Grand Coulee, a large canyon

[13] Unceded land refers to land in North America that was never ceded to a government entity by the first peoples who held the original title to the land.

that was carved out by cataclysmic cycles of flooding of Lake Missoula roughly 15,000 years ago (Figure 2). These floods were caused by the breaking of ice dams that formed Lake Missoula, sending a torrent of water into the Columbia Basin, and scouring out the large canyon of the Coulee. As these fast-moving floodwaters moved through the Grand Coulee, they scoured out plunge pools in the underlying basalt. With the melting of the glaciers, the water receded from the Grand Coulee back into the drainage of the Columbia River as it flows today, leaving a chain of lakes in the scoured-out pools (Central Washington University, 2013; Anderson, 1958).

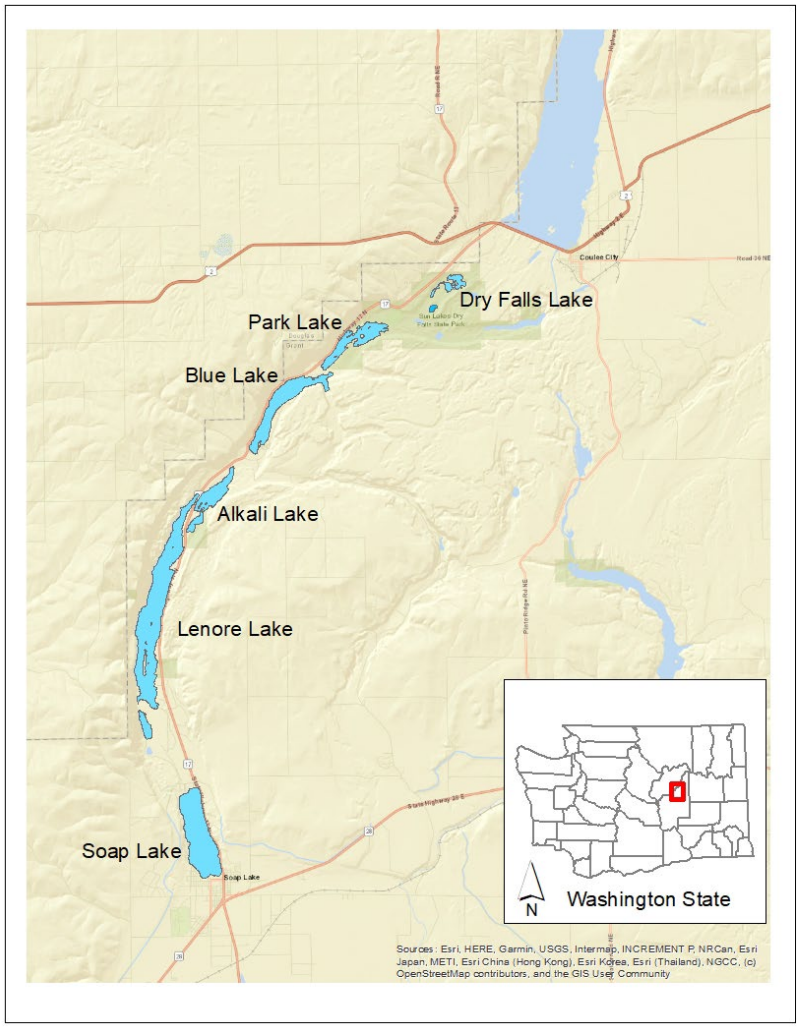

Figure 2 Chain of Sun Lakes in the Lower Grand Coulee

Soap Lake is located in the semiarid region of central Washington, with a mean annual precipitation of 7.5 inches (National Weather Service, 2023). Surface streams connect the upper chain of lakes, which get progressively more saline from north to south. Soap Lake, however, has no surface inlet or outlet. Apart from impacts from the Columbia Basin Project irrigation, which is discussed in the following section, water loss is predominantly through evaporation, and water gains are mostly through precipitation and runoff.

Soap Lake is among a unique class of lakes called meromictic lakes. A meromictic lake is distinguished by its water that is divided into two layers that do not mix together. These layers of water are separated by a gradient that marks where the lake chemistry changes, called a chemocline. In Soap Lake, the chemistry gradient is characterized by an increased concentration of salts in the deeper layer of the lake. The layer above the chemocline is called the mixolimnion, where seasonal mixing occurs much like most temperate lakes in Washington. The denser, more concentrated layer below the chemocline is called the monimolimnion (Figure 3). Because these two layers of water do not mix together, water conditions such as the salinity and levels of oxygen in the lower layer of the water are very different year-round from the upper layer of water.

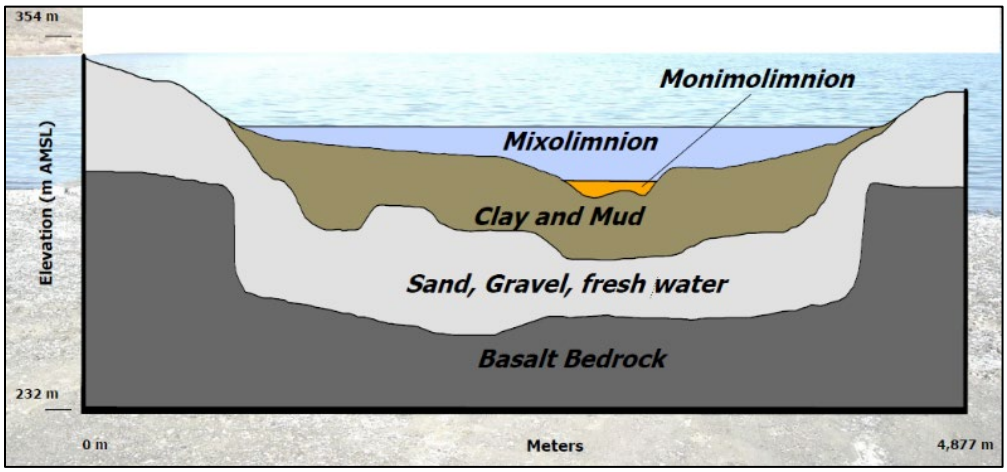

Figure 3 Lake and geologic profile of Soap Lake (Image courtesy of Dr. Leo Bodensteiner)

Meromixis in Soap Lake was likely originally caused when the lake was much shallower than current levels. This likely occurred when the region experienced periods of extreme drying roughly 5,000 to 9,000 years ago, causing significant evaporation of the lake water, reducing the lake volume, and making the lake very saline (Friedman and Redfield, 1971). As the area moved into a cooler climatic pattern, a strong period of precipitation or other influx of freshwater then flowed over the highly saline lake water to raise the level of the lake, but the added freshwater did not mix with the much denser saline lake water, creating two isolated layers (Anderson et al., 1985). To further maintain meromixis, a layer of clay and mud below the lake prevents underlying freshwater from mixing with the deep monimolimnion.

While many lakes can maintain meromixis for tens or hundreds of years, Soap Lake is a unique example of this lake condition. Researchers estimate Soap Lake has maintained this stratification for over 2,000 years, and by some reports up to 6,000-10,000 years, seemingly among the longest documented periods of meromixis (Friedman and Redfield, 1971). This extended meromixis is significant because it has likely allowed the evolution of unique microorganisms, some endemic to Soap Lake, that have adapted to the extreme conditions of the monimolimnion (Dr. Leo Bodensteiner, Western Washington University, personal communication, March 3, 2023).

Columbia Basin Project

United States Congress authorized the Bureau of Reclamation to construct the Columbia Basin Project, an irrigation distribution system to irrigate approximately 1,029,000 acres of the Columbia Plateau that today provides water to approximately 680,000 irrigated acres and sustains the local agricultural economy (Bureau of Reclamation, n.d.). From 1933 to 1955, the project saw construction of the Grand Coulee Dam and a series of irrigation canals that brought water from Franklin D. Roosevelt Lake of the Columbia River to Banks Lake, then distributed across the region. One of these large canals, named the West Canal, runs adjacent to Soap Lake. The West Canal carries irrigation water from the Main Canal and flows north along the east side of Soap Lake passing through the Soap Lake Siphon on the north perimeter of the lake and then south along the west side of the lake (Figure 4). Figure 5 shows a picture of irrigation water in the West Canal on the west side of Soap Lake as it leaves the Soap Lake Siphon.

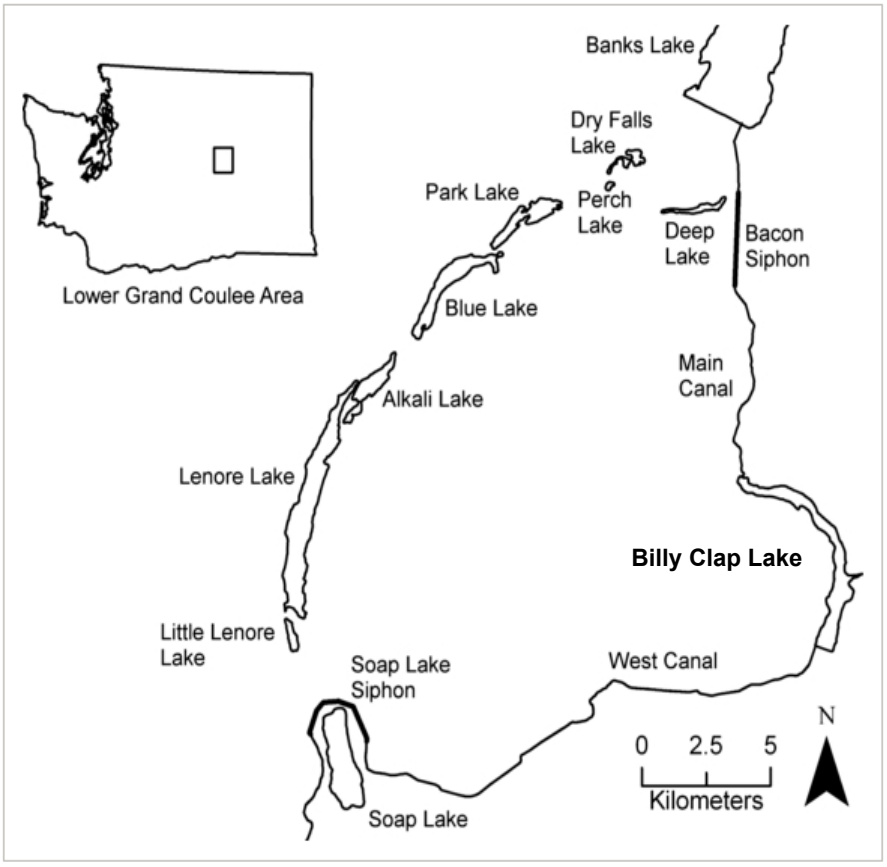

Figure 4. Irrigation canals show water sourced from Banks Lake flowing southwest towards Soap Lake. (Figure adapted from Kallis et al., 2010.)

Figure 5 Irrigation water flows from Soap Lake Siphon (lower right) into West Canal along western side of Soap Lake (Image: Ecology, 2007)

The Soap Lake Protective Works

The Columbia Basin Project brought irrigation water from the Columbia River to the region surrounding Soap Lake beginning in 1950s. With the influx of irrigation water during a time the Soap Lake basin was already experiencing a naturally high water level, Soap Lake water elevations increased further, causing flooding in the City of Soap Lake residents' basements and areas along the shoreline. The infiltration of groundwater from the upgradient irrigation structure and irrigated land caused an increased downgradient flow of groundwater toward Soap Lake. Cumulatively, this influx of water to the basin in context of a wetter than normal natural water cycle in the 1950s caused Soap Lake to rise to record elevations (Kallis, et al., 2010; Marc Maynard, Bureau of Reclamation, personal communication, May 25, 2023).

To protect the town from flooding impacts, the Bureau of Reclamation (Reclamation), at the request of the City of Soap Lake, implemented flood control measures by pumping ground water and surface water. Ultimately these facilities resulted in the system of pumping and monitoring wells that is known today as the Soap Lake Protective Works. This mitigation system protects Soap Lake from an influx of irrigation water, thereby maintaining the elevation of Soap Lake at a level that is predominantly controlled by natural hydrology and helps to preserve the water quality of the lake. The Soap Lake Protective Works are owned by Reclamation and operated by the Quincy-Columbia Basin Irrigation District (QCBID) per contract.

At the center of the mitigation efforts, Reclamation installed a series of wells on the perimeter of the lake to withdraw irrigation water from the ground to control groundwater elevations, which protects the lake and town from flooding. Of the originally constructed mitigation system, seven pump wells are currently maintained: six wells at the south end of the lake and one well at the north end of the lake. To keep groundwater levels at an appropriate gradient to prevent irrigation water from entering the lake, the interception wells are monitored and operated daily throughout the year. Irrigation water from the wells is pumped to the West Canal.

According to the Soap Lake Protective Works Standard Operating Procedures (SOP), "Ground water pumping is to be done in a manner that the ground water influence on Soap Lake will cause its water surface level to remain between elevations 1072 [feet] and 1076 [feet] (Bureau of Reclamation, 1976)." The SOP notes that if lake surface elevations go above 1076 feet, emergency pumping directly from the lake may be necessary to prevent property damage within the town.

During the 1950s and one season in the 1990s, the City of Soap Lake requested Reclamation to pump water directly from the lake surface to lower water levels and decrease the threat of flooding lakeshore property within the city. This activity removed salts from the lake but was a necessary action to protect the city. Each time, once the threat of flooding ceased, surface pumping was stopped. Pumping irrigation water maintains groundwater elevations, so they don't rise and enter the lake. This has resulted in a method that has protected the lake from any potential freshening effects that irrigation water moving through the ground would otherwise have on Soap Lake water levels and quality. During wet climatic cycles, natural groundwater and surface flows can exceed the pumping capacity of the protective facilities causing Soap Lake to rise and reach flood elevation, as experienced in the 1950s and 1990s.

The Soap Lake Protective Works includes facilities that control the water level of upgradient Lake Lenore to prevent influx of water to Soap Lake. The facilities include two pump stations and a connecting channel. With this system, irrigation and flood waters from Lake Lenore are pumped into the Soap Lake Siphon, which is a feature of the West Canal. Today, this system is generally operated from the first of April to mid-June.

In 1966, the Washington State Department of Water Resources (now a program within the Department of Ecology) required Reclamation to submit an annual activities report for the Soap Lake Protective Works operations. Starting in 1976, Reclamation contracted QCBID to assume day-to-day operation and maintenance of the protective works project (Bureau of Reclamation, 1976). QCBID monitors the wells daily, measuring groundwater levels, lake surface elevation, and the salinity of Soap Lake (as measured by conductivity). The reports also document how much groundwater is pumped from the interception wells each year (QCBID, 2022).

During fall and winter when irrigation activities cease for the season, QCBID conducts any needed repairs in the irrigation canals. Approximately once every five years, the Soap Lake Siphon is drained and inspected for maintenance needs. Most of the siphon water is drained north toward Lake Lenore. A small quantity of remaining water that doesn't drain to the north is pumped from the Siphon towards Soap Lake. The amount of water that is pumped toward Soap Lake for each 5-year interval Siphon maintenance is minimal.

Although the salinity of the lake was significantly impacted by the irrigation project initially, Soap Lake Protective Works mitigation activities control Columbia Basin Irrigation Project groundwater influence in the local area. The water chemistry of Soap Lake has since stabilized in the upper layer of water. Before the irrigation project, total dissolved solids in the upper layer of the lake ranged from 29,000 to 32,000 milligrams per liter (mg/L). Following the completion of the irrigation project, total dissolved solids dropped to 20,000 mg/L in 1956, then leveled off to 17,000-18,000 mg/L as measured from 1958-2004 (Walker, 1974; Dr. Leo Bodensteiner, Western Washington University, unpublished data). For comparison, total dissolved solids for freshwater lakes and streams are generally between 50 and 250 mg/L.

By intercepting irrigation water before it reaches Soap Lake through groundwater elevation control, the Soap Lake Protective Works have restored the pattern of lake volume changes to what the lake experienced before the irrigation project, when lake volume was influenced by seasonal effects of evaporation and precipitation (Kallis et al., 2010).

Jurisdictions and land use

Washington Department of Natural Resources (DNR) manages state-owned aquatic land, including tidelands, shorelands of navigable waters, and bedlands, which include land waterward of and below the line of navigability on rivers and lakes not subject to tidal flow. Leases authorized by DNR must include provisions requiring that those seeking a lease on state-owned aquatic land must comply with chapter 90.48 RCW Water Pollution Control, as described in RCW 90.48.386. Upland from DNR's jurisdiction, Soap Lake's shoreline within the city limits is managed by the City of Soap Lake and Grant County manages the shoreline outside city limits.

Along Soap Lake there are two private RV resorts, a lodge, and two public beaches in addition to a handful of private residences. Most of the land adjacent to the lake is undeveloped.

Permitted Activities in Soap Lake

Washington has no current National Pollutant Discharge Elimination System permits issued for discharges to Soap Lake. DNR has three active agreements on the lake for State Route 17 easements. In the past, DNR has authorized a temporary right of entry permit for hydroplane boat races that take place on the lake most years, but as of writing this report, that authorization is not currently active.

Soap Lake Management Plans

Grant County and the City of Soap Lake have developed Shoreline Master Programs (SMPs).[14] SMPs are local land use policies and regulations that guide the use of Washington's shorelines as required by the Shoreline Management Act. SMPs apply to both public and private uses for Washington's more than 28,000 miles of lake, stream, wetland, and marine shorelines. They protect natural resources for future generations, provide for public access to public waters and shores, and plan for water-dependent uses. SMPs control all development within 200 feet of the ordinary high water mark and associated wetlands.

[14] https://fortress.wa.gov/ecy/ezshare/SEA/FinalSMPs/GrantCounty/SoapLake/SoapLakeSMPJun2015.pdf

The SMP supports the City of Soap Lake Resolution 2016-848, adopted December 7, 2016, which outlines goals to protect, preserve, and restore Soap Lake in partnership with the City of Soap Lake through the formation of a Liaison Committee.

The city has also adopted a Comprehensive Plan under the Washington State Growth Management Act, RCW 36.70A. The City of Soap Lake Comprehensive Plan highlights the city's vision to preserve Soap Lake. The plan states that "The City of Soap Lake is a community that recognizes the unique characteristics of Soap Lake and we seek to provide excellent stewardship of the outstanding scenic and natural features which surround us" (City of Soap Lake Comprehensive Plan, 2022).

Both the Shoreline Master Programs and the Comprehensive Plan establish goals and policies related to protecting the unique characteristics of the lake. A common goal stated in the plans is that "The Unique Mineral Content of Soap Lake should be preserved to the greatest extent possible." Policies to support that and other goals of preserving the unique qualities of the lake include:

- The City of Soap Lake should maintain and enforce those regulations which are intended to preserve the mineral content of Soap Lake.
- The City of Soap Lake should encourage and support study and programs that demonstrate methods to preserve the mineral content of Soap Lake.
- Develop stormwater policies which minimize and reduce paved and hard surface areas, both public and private. Reducing pavement and controlling runoff is part of the stormwater plan, which is aimed at reducing runoff into the mineral lake.

Mineral water withdrawals

The City of Soap Lake owns and operates an unmetered mineral water system that withdraws water from the lake to provide water to local businesses. The original water rights application was filed June 5, 1940, for 1 cubic feet per second of water from the lake for "Medicinal, therapeutic baths, and for swimming pools and such other uses as are incidental at a health resort." There are five active connections to the mineral water system:

- 1 residential
- 1 multi-family
- 1 commercial spa
- 2 for a hotel

The Mineral Water Systems Plan provides estimates for water consumption through the unmetered system. From January to December of 2017, the estimated mineral water consumption was 160,000 gallons and from January 1 to July 8 of 2018, consumption was estimated at 88,395 gallons (Gray and Osborn, 2019).

Soap Lake Water Quality Condition

Soap Lake water is highly saline and registers a pH of almost 10. Historical values of salinity as measured by total dissolved solids in the upper layer of lake water ranged from 18,000 mg/L in 1964 to 34,000 mg/L in 1946 (Edmondson and Anderson, 1965). In freshwater lakes, salinity

generally ranges between 1-500 mg/L. In the monimolimnion, the water is roughly three to five times saltier than the ocean, and resembles a thick, syrupy consistency. Edmondson and Anderson (1965) reported a high salinity of 156,000 mg/L in 1961. For comparison, ocean salinity is generally around 35,000 mg/L.

Soap Lake is also highly alkaline, with high levels of carbonates that contribute to the soapy feeling of the lake. Surface water samples from 1950 and 1951 showed average concentrations of carbonates and bicarbonates at 8,500 and 2,000 milligrams per liter (mg/L) respectively. Alkalinity is much greater in deeper parts of the lake. At a depth of 20 meters, concentration of carbonates averaged 24,000 mg/L, and concentrations of bicarbonates averaged 4,800 mg/L (Anderson, 1958).

In addition to being anoxic, or having no dissolved oxygen, the monimolimnion contains extremely high levels of arsenic and sulfides. In fact, the sulfide levels in the monimolimnion are the highest reported in a natural waterbody (Rice, et al., 1988; Sorokin, et al., 2007). Figure 6 shows the distinct change in lake chemistry as measured by dissolved oxygen, total dissolved solids, and hydrogen sulfide from the upper layer of water to the deeper monimolimnion (Sorokin et al., 2007).

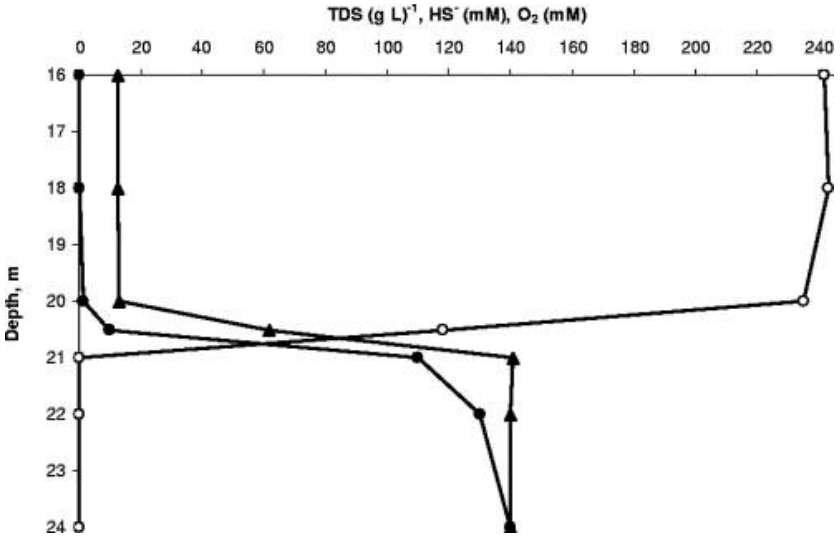

Figure 6 Depth profile of dissolved oxygen (open circles), total dissolved solids (TDS; filled triangles), and sulfide (filled circles). Image from Sorokin et al., 2007.

Throughout the lake, over 20 different minerals have been detected, including sodium, sulfate, bicarbonate, carbonate, and chloride (Anderson, 1958; Bennett, 1962). Table 1 shows the levels of different minerals and metals found in samples taken from the surface and bottom water of Soap Lake.

Table 1 Concentration of minerals and metals (mg/L) measured in top and bottom of lake in 2005 (Unpublished data courtesy of Dr. Leo Bodensteiner, Western Washington University)

Parameter	Top layer (1 m; mg/L)	Bottom layer (23 m; mg/L)
Sulfur	1000	87000
Sodium	5700	52000
Potassium	560	4100
Phosphorus	0.32	72
Silicon	43	45
Magnesium	2.5	4.2
Arsenic	0.34	2.4
Boron	<0.05	<0.05
Barium	0.0011	0.039
Manganese	<0.0005	0.022
Nickel	<0.005	0.015
Tin	<0.005	<0.005
Cobalt	<0.001	<0.001

Because Soap Lake has no surface water inlet or outlet streams, it is a closed system. Surface runoff to the lake occurs infrequently, most commonly after snowmelt or after heavy rainfall (Kallis et al., 2010; City of Soap Lake Comprehensive Plan, 2022). Therefore, with the Soap Lake Protective Works managing groundwater flows, lake volume is mostly influenced by precipitation and evaporation. Precipitation is greatest during December through April, and evaporation is greatest May through September (Kallis et al., 2010).

In addition to total dissolved solids, which measures the amount of salts in the water, another way to show salinity is by measuring the conductivity of the water. Conductivity measures the concentration of all ions, or charged particles, in the water, like sodium (Na^{+}), potassium (K^{+}), magnesium (Mg^{2+}), sulfate (SO_4^{-2}), and carbonate (CO_3^{-2}), by measuring the ability of the water to conduct current. Figure 7 shows the surface water conductivity of Soap Lake reported by Reclamation between 1968 and 2021. Average surface water conductivity is 20,766 microsiemens per centimeter (µs/cm) (Reclamation, unpublished data, 1968-2021). Because the lake is not influenced by surface water inputs, conductivity is generally lower in the winter months when precipitation is higher, and higher in the summer months when there is infrequent precipitation and higher rates of evaporation due to warmer temperatures.

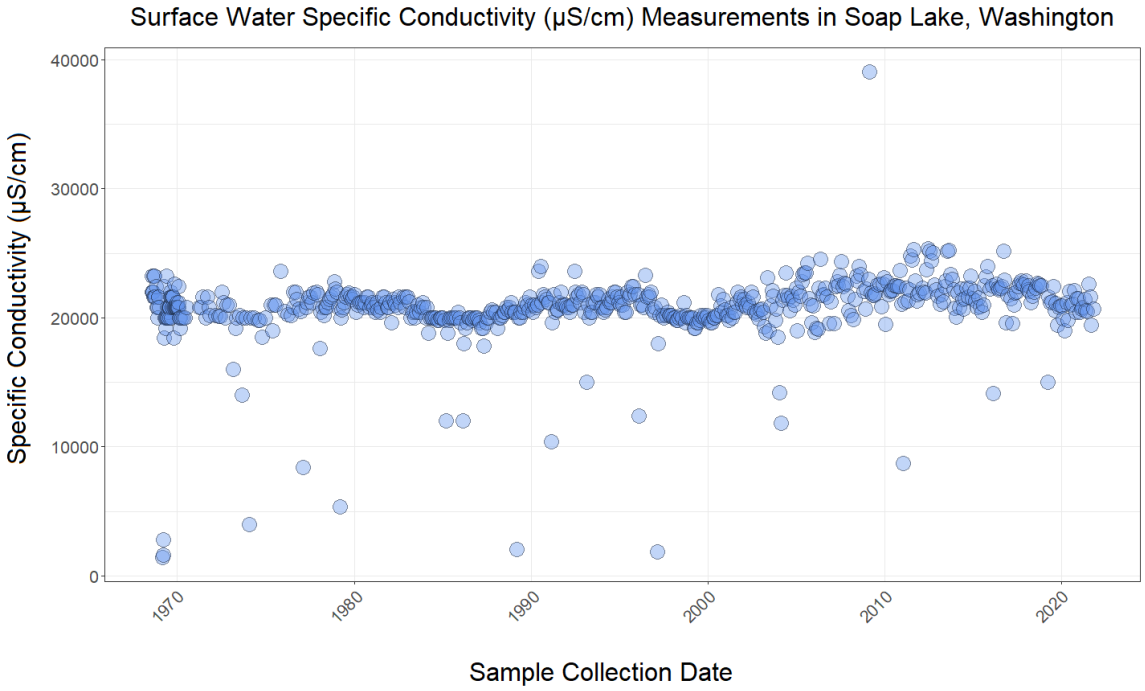

Figure 7 Monthly surface water conductivity of Soap Lake from 1968-2021 (US Bureau of Reclamation)

While the salinity of Soap Lake decreased following the completion of the Columbia Basin Irrigation Project, the Soap Lake Protective Works have stopped further dilution of the lake by intercepting fresh groundwater from upland irrigation before it enters the lake (Walker, 1974). As such, conductivity, as a measure of salinity, has varied little since the 1960s.

Water quality of Washington lakes

In 2017, Ecology took part in EPA's National Lakes Assessment[15] and sampled water quality from lakes across Washington. Figure 8 shows the ranges of parameters in common with Soap Lake from 50 Washington lakes sampled as part of this assessment. These 50 lakes were randomly selected using EPA's survey design throughout the state. The box and whiskers plot in the figure represents the statistical summary and range of values from those 50 lakes. The random survey design allows us to scale up the use of the data in a statistically meaningful way to represent all lakes in Washington. Compared to lakes surveyed as part of the 2017 National Lakes Assessment, Soap Lake is exceptionally high in levels of calcium, chloride, magnesium, sodium, and sulfate.

[15] https://www.epa.gov/national-aquatic-resource-surveys/nla

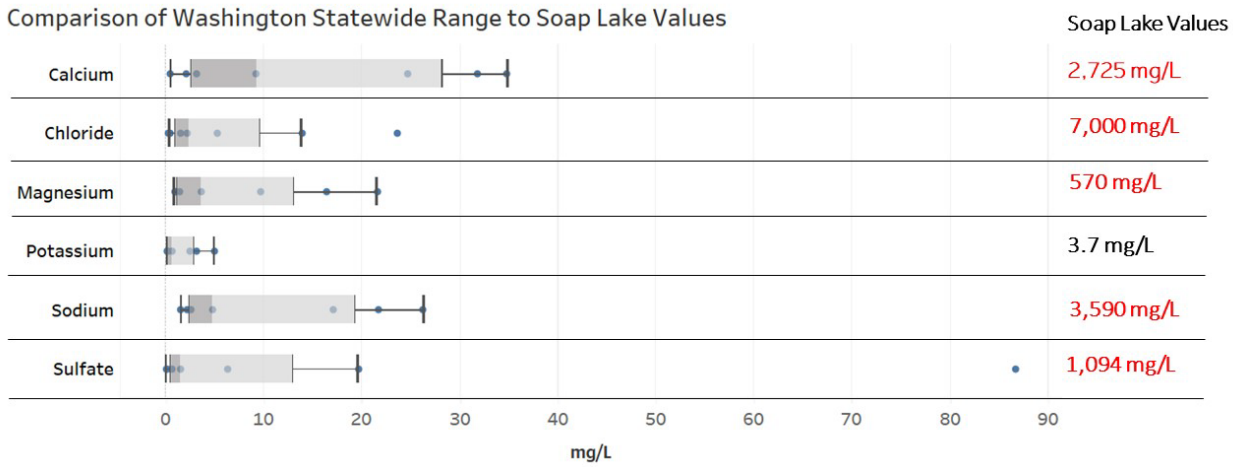

Figure 8 Statewide ranges for water quality parameters based on 50 lakes sampled in Washington. Soap Lake values are given on the right for comparison (Ecology, 2023; Soap Lake Conservancy, unpublished data).

Nonpoint source pollution

The primary sources of nonpoint pollution are from agriculture, urban areas, and highway runoff (Peyton and Yonge, 2002). Leakage from septic systems near the lake may also be a potential source of pollution.

The City of Soap Lake Comprehensive Plan (2021) references the need for greater stormwater controls to protect lake water quality. Stormwater runoff enters the lake at the following primary points, and are shown in Figure 9:

- Channels enter the lake from the southeast via a swale to the west of Daisy Street through a drainage pipe that deposits onto East Beach;
- Water collects from the Rock parcel near the center of town and enters a drainage pipe that deposits in the center of the Lake's south shore; and
- Stormwater collects from the southwest and deposits at Smokiam Park.

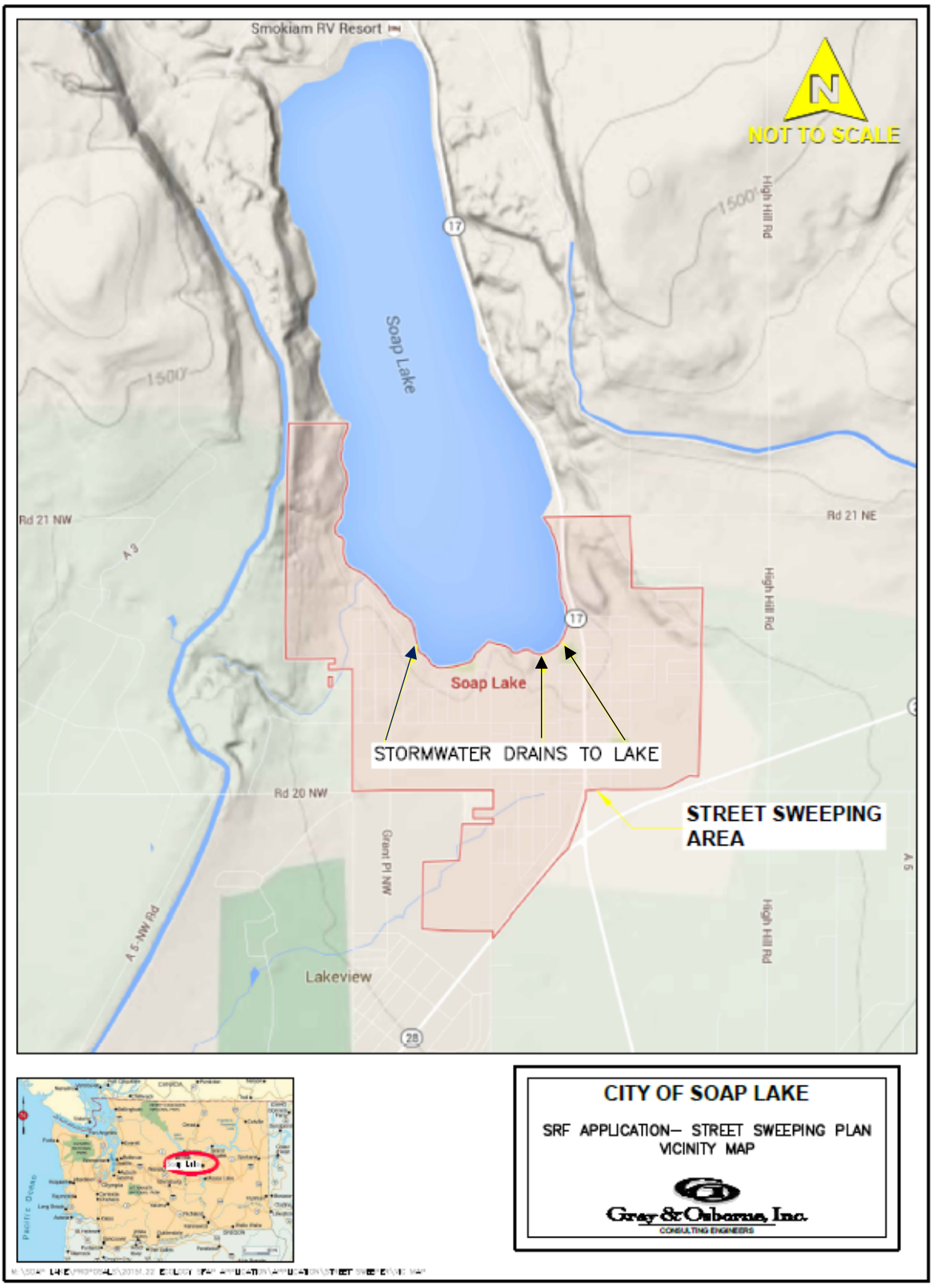

Figure 9 Map of stormwater drains to Soap Lake (From City of Soap Lake)

The primary management concerns for Soap Lake are preventing excess freshwater inputs into the lake to preserve the unique mineral profile and to preserve meromixis. The lower monimolimnion layer represents a small percentage of overall lake volume (less than 1% of lake volume by some estimates), but its presence and isolation from the upper water layer marks the unique character of the lake (Kallis et al., 2010). However, the extent of the monimolimnion is decreasing. The chemocline is receding at a mean rate of 7.78 cm per year, resulting in volume change of approximately 584,000 cubic meters between 1958 and 2003 (Kallis, et al., 2010). This decrease could be from a number of factors including effects of climate change or changes to the salinity of groundwater seeping into the monimolimnion (Kallis, et al., 2010).

Outstanding Resource Water attributes

Soap Lake meets the following eligibility criteria as an outstanding resource water in WAC 173-201A-330(1):

- The water has unique aquatic habitat types (for example, peat bogs) that by conventional water quality parameters (such as dissolved oxygen, temperature, or sediment) are not considered high quality, but that are unique and regionally rare examples of their kind;
- The water has both high water quality and regionally unique recreational value; and
- The water is of exceptional statewide ecological significance.

The proponents also provided information under the following eligibility criteria:

- The water has cold water thermal refuges critical to the long-term protection of aquatic species. For this type of outstanding resource water, the nondegradation protection would apply only to temperature and dissolved oxygen.

However, because the natural lake condition does not provide habitat suitable for fish, we have determined that the lake does not meet the intent of this eligibility criteria.

Unique habitat of Soap Lake

As a meromictic, alkaline lake, Soap Lake is unique among Washington's lakes. Roughly 32 known meromictic lakes exist in the United States, approximately six of which are found in Washington (USGS, 1985). Among the documented meromictic lakes in Washington, Soap Lake is the largest by surface area and total volume (Table 2). Other states have recognized the need to protect the unique characteristics of meromictic lakes. For example, Mono Lake in California is also designated as an outstanding national resource water by the state of California due to its unique meromictic quality and ecological significance in providing unique aquatic habitat for birds that are dependent on brine shrimp for food (State of California Water Resources Control Board, 1994).

Table 2 Surface area, volume, and maximum depth of meromictic lakes in Washington (Walker, 1974; USGS 1985)

Lake	Surface area (hectares)	Total volume (cubic meters)	Maximum depth (m)
Soap Lake (Grant County)	339	29.6	27
Soap Lake (Okanogan County)	62.6	5.5	17.5
Blue Lake	44.3	8.6	34
Langlois Lake	39	29	29
Lower Goose Lake	21.8	2.7	28
Hot Lake	1.3	0.014	1.5

The lower layer of Soap Lake's water is completely anoxic, meaning it contains no dissolved oxygen in the water, and registers perhaps the highest level of dissolved sulfides measured in a lake (Rice et al., 1988). Despite these extreme conditions, this layer of water supports a very diverse community of bacteria (Dimitriu et al., 2008), with some species unique to Soap Lake (Paul and Mormile, 2017). These unique bacteria depend on the extreme conditions of the monimolimnion that are preserved by meromixis.

The unique foam that appears on the lake shore is created by wind that churns up minerals in the lake water – minerals which are similar to those found in soap (Figure 10).

Figure 10 Naturally forming suds appear on the shore of Soap Lake. (Image courtesy of Alison Gooding, Soap Lake Conservancy.)

While it is rare to see this foam currently, a State of Washington report noted some of the unique characteristics of the Soap Lake foam (Bennet, 1962):

> "The outstanding natural characteristic that makes Soap Lake different from other saline lakes is the quantity and "toughness" of the foam that develops under certain conditions…The foam contains an unexpected constituent, a water soluble heavy oil. . ..This foam when freshly formed was a snowy white, but on standing turned yellow, and finally after several days broke into an evil-smelling black muddy liquid…"

Regionally unique recreational value

Soap Lake has been a significant site for tribes for thousands of years. In a unanimous vote to nominate Soap Lake as an Outstanding Resource Water, The Confederated Tribes of the Colville Reservation (CTCR) business council noted that "Soap Lake is an ecologically unique and culturally significant surface water to the CTCR and other Tribes in the Columbia Plateau" (CTCR, 2021). Tribes gathered on the shores of the lake for ceremonies and used the waters to heal those suffering from ailments. In a ceremony unveiling the Calling the Healings Waters statue at the south end of Soap Lake, Colville Tribal elder Barbara Aripa reflected on the importance of Soap Lake to her people: "We swam in the water for cleansing and healing because after the long winter, we needed to feel the medicine in our hearts, in our minds, and on our bodies" (Kiefer, 2013, May 15).

Soap Lake has a long been a destination for those seeking to soak in the water to treat numerous conditions such as rheumatism, liver and kidney diseases, and skin conditions. Before the proliferation of modern antibiotics, the lake was populated with sanitariums to house afflicted travelers seeking treatment from the lake water (City of Soap Lake Comprehensive Plan, 2021). It was especially popular for World War II veterans seeking treatment for an inflammatory condition called Buerger's disease, which could lead to gangrene on arms and legs. Today, Soap Lake is a significant draw for visitors looking to ease various maladies or simply enjoy a soak in the unique water (Soap Lake Conservancy, 2023).

Exceptional ecological significance

While Soap Lake doesn't provide the conditions to support fish or larger vertebrates, the ecological significance of the lake can be appreciated on a more microscopic scale. Soap Lake is home to bacteria that are particularly well-adapted to the extreme high saline, high sulfide environment found in the bottom layer of water.

In 2002, Soap Lake was designated a Microbial Observatory by the National Science Foundation, which provided funding to Central Washington University researchers to study the diversity and productivity of bacterial communities in the lake. Researchers have discovered at least four species of bacteria that are endemic to Soap Lake (Table 3). In 2004, research scientist Pedro Dimitriu remarked on the significance of such research:

> "This lake is basically in the middle of the desert. Finding these new bacteria shows that rain forests aren't the only sources of biodiversity that need to be protected. Soap Lake

needs to be protected, and this will help prove it needs to be in the future" (University of Missouri-Rolla, 2004).

Table 3 Novel bacteria found in Soap Lake

Novel bacterium	Reference
Halomonas campisalis	Summarized in Paul and Mormile, 2017
Nitrincola lacisaponensis	Summarized in Paul and Mormile, 2017
Thioalkalimicrobium microaerophilum[16]	Sorokin et al. 2007
Thiocapsa imhoffii	Summarized in Paul and Mormile, 2017

These unique bacteria have drawn interest from researchers for their potential industrial and environmental applications. Some bacteria that are adapted to hypersaline environments such as Soap Lake can break down toxic industrial wastewater to produce a cleaner effluent, aid in the production of biofuels, and degrade toxic chemicals like pesticides (Paul and Mormile, 2017; Begemann, et al., 2012; Peyton and Yonge, 2002). Researchers continues to study these extreme bacteria for novel industrial uses.

Further, the unique bacteria of Soap Lake lend to research about potential life forms on other planets. One study has shown the ability of some bacteria to create a salt called mirabilite that was originally believed to only be created by non-living processes (Pinkart et al., 2006). This discovery has led researchers to question if mirabilites found on other planets were perhaps once caused by similar life forms, rather than from non-living chemical processes.

The novel applications and research value of these bacteria highlight the ecological importance of the extreme environment in which they reside. It is likely that Soap Lake will continue to be a source for new scientific discoveries.

Beyond the unique microbial community, Soap Lake supports many species of shorebirds and waterfowl. Year round, eared grebes are present in high numbers (WDFW, 2023). The Coeur d'Alene Audubon Society (2013) has reported that Soap Lake supports the largest known Eastern Washington population of eared grebes, with summer counts of approximately 800 birds. While Boyd et al. (2021) report that Mono Lake, an outstanding resource water designated in California, along with the Great Salt Lake, support the largest number of eared grebes, the unique waters of Soap Lake provide important regional forage habitat for this species.

During spring and fall migration, large numbers of waterfowl such as ruddy ducks are present, with high counts of approximately 5000 individuals reported on the online bird observation database eBird (WDFW, 2023; eBird, 2023). The lake also attracts high numbers of shorebirds such as the red-necked phalarope, western sandpiper, and lesser yellowlegs (WDFW, 2023; eBird 2023).

[16] Reclassified as *Thiomicrospira microaerophila comb. nov*. in Boden R, Scott KM, Williams J, Russel S, Antonen K et al. (2017). An evaluation of Thiomicrospira, Hydrogenovibrio and Thioalkalimicrobium: reclassification of four species of Thiomicrospira to each Thiomicrorhabdus gen. nov. and Hydrogenovibrio, and reclassification of all four species of Thioalkalimicrobium to Thiomicrospira. Int J Syst Evol Microbiol; 67:1140–1151

Water quality standards ORW designation and specific criteria

In consideration of the eligibility criteria and public comment received, Ecology has designated Soap Lake as an outstanding resource water under Tier III(B) protection in WAC 173-201A-332 Table 332 – Outstanding Resource Water designations by water resource inventory area (WRIA).

Tier III(B) protection requires that any new or expanded discharges to Soap Lake limit degradation of lake water to below measurable amounts. This designation level recognizes the need to balance protecting the conditions of the lake with the needs of the developing community around the lake.

The outstanding resource water designation for Soap Lake recognizes the unique mineral content of the lake. To that end, a Tier III(B) designation protects Soap Lake from human activity that would cause the lake to freshen beyond a measurable amount. We define measurable change for Soap Lake as:

- A decrease in conductivity of 639 microsiemens per centimeter (µS/cm) or greater.

We base the measurable change for conductivity on the US Geological Survey (USGS) analysis of uncertainty for specific conductance measurements (USGS, 2019). USGS reports that the uncertainty for most routine specific conductance measurements is estimated to be less than 3 percent of the most probable value for specific conductance when values are measured at greater than 100 µS/cm. Based on conductivity data from 1968-2021, the average conductivity for Soap Lake as measured April through October is 21,290 µS/cm. Based on the average, a 3 percent measurement uncertainty is approximately 639 µS/cm.

In addition, human actions are not to cause lake conductivity to decrease below 19,843 µS/cm as calculated as a seasonal (April through October) average more than once in 10 years. This value is based on the combined distribution function of the seasonal means of conductivity from 1968-2021 and represents the 10th percentile of those means. The seasonal average conductivity is calculated as the arithmetic average of seven or more samples collected April through October. Samples should be distributed throughout the sampling period.

We excluded monthly values measured January through March and in November and December because these months represent the wettest season in terms of precipitation and would have a cumulative effect on conductivity values.

Variability of the conductivity data was explored using multiple statistical methods. The standard deviation per month using all available data was calculated. During January through March, standard deviation varied between 3,290 and 5,420 µS/cm. However, in April through December, standard deviation was much smaller: values ranged from 784 µS/cm in December to 1,600 µS/cm in August (two to seven times smaller in comparison).

In addition, a one-way analysis of variance (ANOVA) was performed to determine whether there was a significant difference in means for conductivity by month. The results of this analysis indicate that the average monthly values were significantly different from one another (*p*-value was $1.26*10^{-13}$). A subsequent post-hoc pairwise t-test indicated several significant differences between:

- February and the months of June through November
- March and the months of April through December

We did not see significant differences between any paired combination of months between April and December. Neither did we find any significant differences between January and February / March or February and March.

The ANOVA, post-hoc pairwise t-test, and standard deviation analysis all suggest that the data collected during the winter months (January – March) are either significantly different from data collected during other seasons or are more highly variable compared to other seasons.

These differences and variability can be explained, in part, due to meteorological effects. The cumulative impacts of precipitation and possible ice melt in the surface layers of the lake (where sampling occurs) each have a negative impact on conductivity, causing long-term means to be different from the other seasons. In addition, the inter-annual differences in ice melt and precipitation may explain some of the large variability seen in these winter months compared to the other seasons. Thus, to ensure sampling data are representative of typical conditions experienced by the lake, data from January through March were excluded from further analysis.

The November and December data were excluded from analysis due to meteorological reasons and a desire to capture representative data during times of the year where there is the largest likelihood of human impacts to the lake. Long-term precipitation trends indicate that the months of November and December have the highest recorded rainfall; this would result in a decrease of conductivity in the surface water compared to the drier summer months. Further, the agricultural season around the lake extends from April through October. These months are the period where there is the highest risk of freshwater inputs entering into the lake because of human actions, and data collected during these months would help identify when these impacts are occurring to the system.

Thus, to capture the times of the year when humans would have the largest potential impacts to the lake alongside the larger rainfalls experienced in the winter months, the months of November and December were also excluded from further analysis.

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Review of the Cascade River for ORW Designation

Geography

The Cascade River is located entirely within Skagit County and runs through land historically home to the Upper Skagit and Sauk-Suiattle Tribes. The river flows for 29 river miles from the South Cascade Glacier on Sentinel Peak to the Skagit River at the town of Marblemount. The Skagit River watershed, which includes the Cascade River, is the largest watershed in Puget Sound.

Outstanding resource water boundary

In consideration of the eligibility criteria and public comment received, Ecology has designated the Cascade River in WRIA 4 – Upper Skagit watershed upstream from the west boundary of Mount Baker Snoqualmie National Forest (48.5324, -121.3078) at the west section line of Section 07, Township 35 North, Range 12 East, to headwaters, including tributaries (Figure 11). Large tributaries within this boundary include Sibley Creek, Found Creek, Kindy Creek, and Marble Creek. The river and tributaries add up to nearly 150 miles of streams.

We include all tributaries to the Cascade River within the ORW boundary. This is consistent with WAC 173-201A-260(3)(b), which states that "[u]pstream actions must be conducted in manners that meet downstream waterbody criteria.... the criteria associated with the most upstream uses designated for a water body are to be applied to headwaters to protect... the designated downstream uses." Including upstream tributaries is important to protect the river if pollution sources were to degrade water quality in upstream areas.

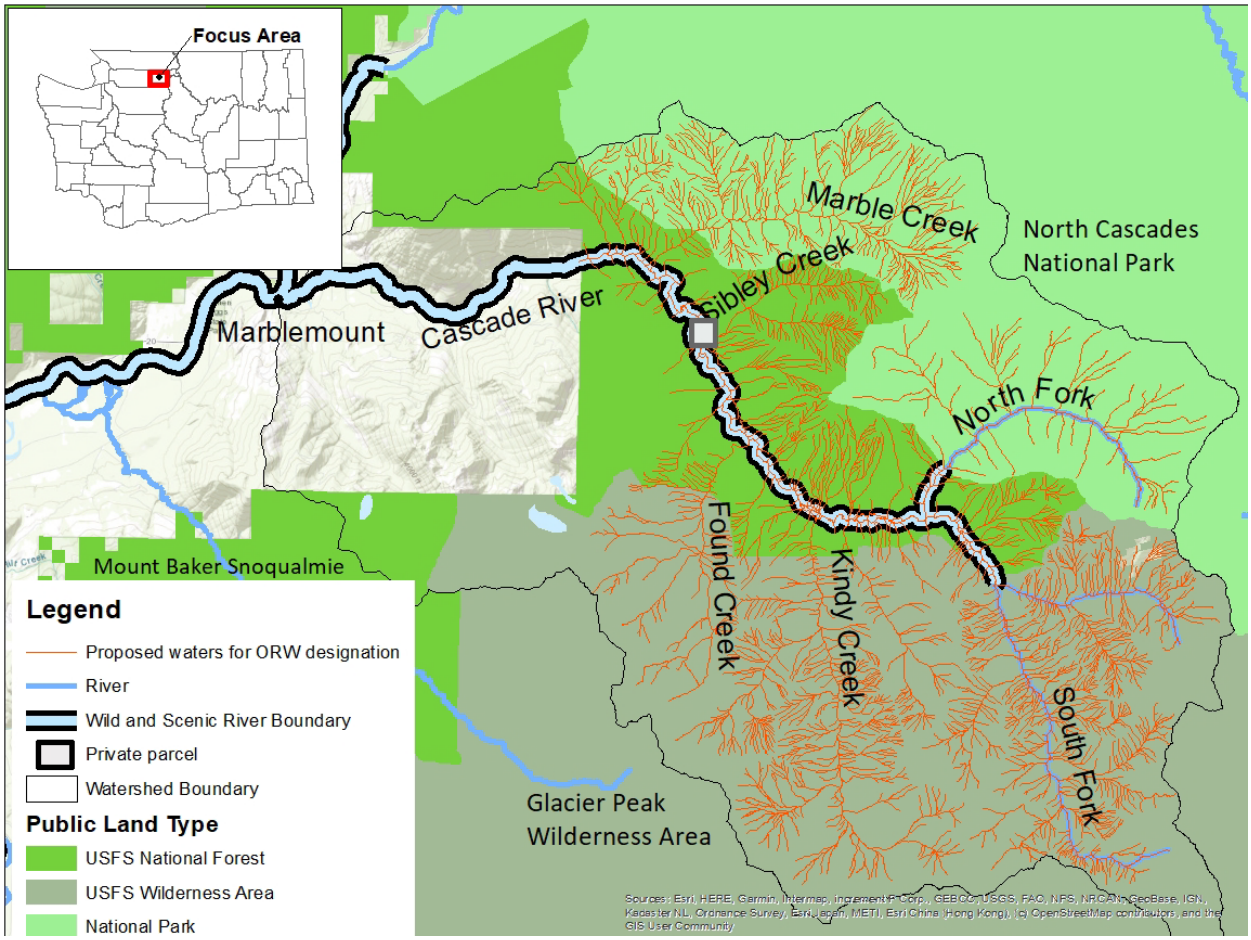

Figure 11 Proposed outstanding resource water designation for the Cascade River and tributaries.

Existing designations and land use

The outstanding resource water boundary for the mainstem Cascade River falls within existing protected areas, and the entire boundary is under US Forest Service or National Parks Service jurisdiction. The majority of the North Fork Cascade River and Marble Creek are within North Cascades National Park. The Middle Fork and most of the South Fork are within the Glacier Peak Wilderness Area. Appendix A provides a comparison of how land and water is protected by Wild and Scenic Rivers, Wilderness designation, and Outstanding Resource Waters.

Human activity within the ORW boundary is limited. There is one private inholding of 21 acres within the national forest, one surface water rights withdrawal on the North Fork Cascade River within the North Cascades National Park, a series of roads, two federal campgrounds and seven hiking trails. No permitted outfalls are located within the boundary. Figure 12 shows a map of roads, campgrounds, and most trailheads in the upper Cascade River.

Eight open roads are maintained within the ORW boundary. Of those, five roads are maintained as “suitable for passenger cars,” and total approximately 33 miles. This includes 22.7 miles of the Cascade River Road, that follows the river to the headwaters of the North Fork. Three roads

are maintained for high clearance vehicles. The boundary also includes 17 roads, totaling 15 miles, that are closed but maintained for "basic custodial care." The average length of closed roads within the boundary is approximately 0.9 miles (data provided by US Forest Service).

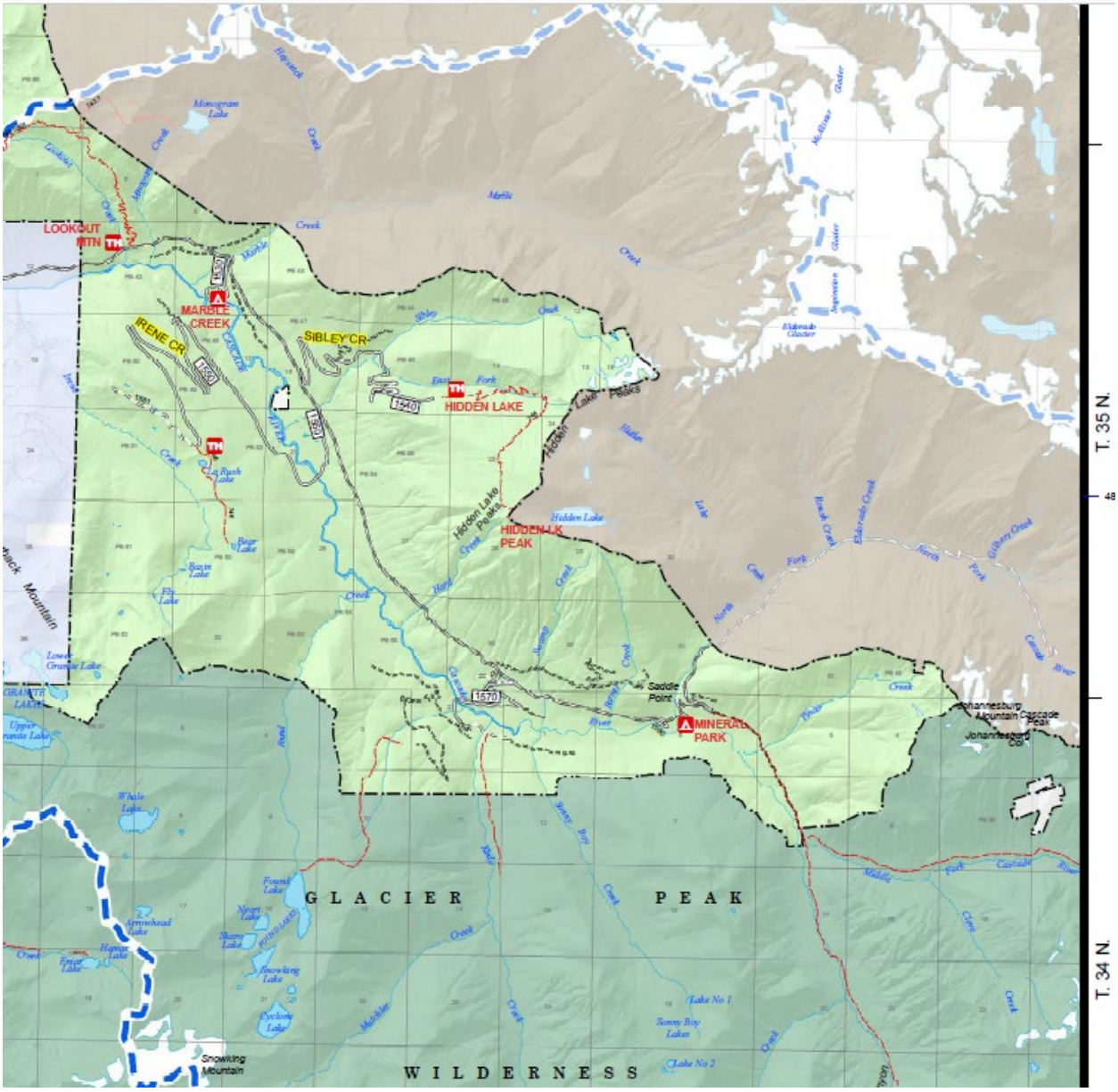

Figure 12 Map of roads, trailheads, and campgrounds in the upper Cascade River watershed (US Forest Service)

US Forest Service designations

In addition to the protections afforded by the national park and wilderness area designations, the Cascade River has several designations that protect the natural resource values of the area. Land within the Mt. Baker Snoqualmie National Forest is managed as Late Successional Reserve, administratively withdrawn, or congressionally withdrawn as wilderness (US Forest Service, 2002). Late successional reserve land is defined as land "reserved for the protection and

restoration of late successional and old growth forest ecosystems and habitat for associated species" including northern spotted owl.

Inventoried Roadless Area

The ORW boundary includes land mapped as Inventoried Roadless Areas. Roadless areas were originally identified as part of a Forest Service Roadless Area Review and Evaluation conducted in the 1970s for areas of undeveloped land larger than 5,000 acres, with the intent to designate wilderness or other management directions (US Forest Service, 1979). Protections in Roadless Areas were established through the 2001 Roadless Area Conservation Rule, which identifies roadless areas as having properties such as high quality or undisturbed soils, water, and air, sources of public drinking water, or primitive, semi-primitive, non-motorized and semi-primitive motorized classes of dispersed recreation (Special Area; Roadless Area Conservation, 2001). The 2001 Roadless Area Conservation Rule sets limits on road construction, reconstruction, and timber harvest.

The Mount Baker-Snoqualmie National Forest Inventoried National Roadless Areas map shows two categories of roadless areas within the ORW boundary: Inventoried Roadless Area that allows road construction and reconstruction and Inventoried Roadless Area that does not allow road construction or reconstruction (US Forest Service, 2000).

Wild and Scenic River designation

The mainstem and lower reaches of North and South forks are designated "Scenic" as part of Wild and Scenic designation for Skagit River system (Figure 11). A river is designated "scenic" if it is "free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads" (National Wild and Scenic Rivers System, 2019). The designation is based on the outstanding natural, cultural, and recreational values for the river. For the Cascade River, these values include fish, wildlife, and scenic qualities. A scenic designation protects the free-flowing condition of the river, its water quality, and outstandingly remarkable values from development that could impact these qualities.

Protection from hydroelectric development

The Northwest Power and Conservation Council (2023) has designated areas within the ORW boundary as protected from hydroelectric development. This means that the Federal Energy Regulatory Commission must consider protected areas before granting licenses for a new hydroelectric facility. Areas protected under this designation include Marble Creek, Kindy Creek, and part of Sibley Creek, as well as the North Fork and part of the South Fork Cascade River. These areas are protected based on their critically important fish and wildlife resources (Northwest Power and Conservation Council, 2023).

Shoreline of Statewide Significance

The Cascade River is designated as a Shoreline of National Significance. However, this designation does not apply to the section of the river within the ORW designation boundary. The point at which the mean annual flow of the Cascade River reaches the minimum level for the designation (which is 1,000 cubic feet per second) is downstream of the boundary, beginning at the mouth of Boulder Creek.

Water quality

The South Cascade Glacier provides cold glacial melt water to the Cascade River. The Cascade River is "one of the primary glacially-fed streams in the Skagit [River Basin]" (Riedel and Larrabee, 2016).

A water quality monitoring station is located near the mouth of the river at Marblemount, downstream of the ORW boundary. Average flow at this location is 717 cubic feet per second (2006-2023; USGS 2023). Average monthly temperature between 2016-2022 ranged from 4 °C in February to 13 °C in August (USGS, 2023).

The Cascade River and tributaries are not listed as a polluted waterbody for any parameter. Ecology has not received any water quality monitoring information for the Cascade River in the Environmental Information Management System database.[17]

Water quality information is available through the US Forest Service Watershed Condition Framework. The Watershed Condition Framework was established in 2010 to provide "consistent, comparable, and credible process for improving the health of watersheds on national forests and grasslands" (USDA, 2023). An outcome of this framework was the development of a "nationally consistent, science-based approach to classify the condition of all National Forest System…watersheds and to develop outcome-based performance measures for watershed restoration" (USDA, 2011). The framework measures a series of watershed indicators including water quality, aquatic habitat condition, and overall watershed condition. Watershed conditions for the North Fork Cascade River, the South Fork Cascade River, Kindy Creek, and Upper Cascade River have a "good" water quality rating, meaning there is "minimal to no impairment to beneficial uses of the water bodies in the watershed" (USDA, 2011).

Aquatic habitat condition, which evaluates habitat fragmentation, large woody debris, and channel slope and function, was rated "good" for the North Fork and South Fork Cascade River, meaning the watershed supports "large continuous blocks of high-quality aquatic habitat and high-quality stream channel conditions" (USDA, 2011). The aquatic habitat condition for the Upper Cascade Watershed was rated "fair," meaning "the watershed supports medium to small blocks of contiguous habitat. Some high-quality aquatic habitat is available, but stream channel conditions show signs of being degraded" (USDA, 2011).

[17] https://ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database

Outstanding Resource Water attributes

The Cascade River meets the following eligibility criteria as an outstanding resource water in WAC 173-201A-330(1):

- The water is in a relatively pristine condition (largely absent human sources of degradation) or possesses exceptional water quality, and also occurs in federal and state parks, monuments, preserves, wildlife refuges, wilderness areas, marine sanctuaries, estuarine research reserves, or wild and scenic rivers;
- The water has both high water quality and regionally unique recreational value; and
- The water is of exceptional statewide ecological significance.

Relatively pristine condition and in a protected area

The headwaters of the Cascade River have very limited development and are relatively free from human sources of degradation. No permitted outfalls are located within the ORW boundary, and only one 21-acre private parcel is within the boundary. Likewise, the area within Forest Service management is allocated as late-successional reserve to protect old growth forest and resident fish and wildlife. Land use activities are limited to short-term projects to maintain existing infrastructure. According to a National Marine Fisheries Biological Opinion, "[m]ost areas in the Skagit River Basin have some level of riparian degradation," but reported that "[t]here has been little riparian degradation in the Cascade River" (2018). The Biological Opinion also notes that there is no known hydromodification, or alteration of the river channel from human activities such as development, in the upper Cascade River.

The Cascade River within the ORW boundary falls within the following categories of protection: Wild and Scenic River designation, Glacier Peak Wilderness Area, and North Cascades National Park. Approximately 45 miles of named tributaries to the Cascade River do not fall within a protected area but are rather within the Mt. Baker-Snoqualmie National Forest. We include these tributaries for the downstream protection of the river.

High water quality and regionally unique recreational value

US Forest Service data indicates minimal to no water quality impairments to beneficial uses for the Cascade River within the ORW boundary (USDA, 2011). Given that this area of the watershed has limited riparian degradation and mature forest, activities that would degrade water quality are minimal.

Along with the relatively pristine condition of the Cascade River headwaters, the area provides unique recreational opportunities that draw in visitors to Skagit County. These visitors are drawn to the region for the excellent kayaking, fishing, hiking, and camping opportunities, and provide important revenue for local communities.

The area is well-known for whitewater kayaking. American Whitewater (2022) provides the following description of the river:

> Located just outside of the North Cascades National Park, the Cascade flows through one of the most beautiful areas in the nation. The Cascade River provides some of the best continuous whitewater in the state. While none of the individual drops on the Cascade are overly difficult, the continuous nature of the run makes it suitable for advanced boaters. A high water run on the Cascade provides one of the best class V big water runs in the state. Lower water runs also give paddlers a great, albeit slower, class IV-V run over countless ledges and through numerous boulder gardens.

Several federal hiking trails and campgrounds are within the ORW boundary, including the Marble Creek Campground, Mineral Park Campground, Hidden Lake Trail and Hidden Peak Lookout, and Lookout Mountain trail.

The Hidden Lake Trail, which makes two crosses over Sibley Creek, is described as "one of the crown jewels of hiking in Washington State" (Washington Trails Association, 2023). This trail, along with Lookout Mountain Trail, take hikers to a fire lookout and panoramic views of the North Cascades.

Mineral Park Campground, near the confluence of the North and South Forks, is described as "scattered beneath a towering canopy of diverse forest" (Recreation.gov, 2023). Marble Creek Campground is "remote and nestled amongst giant Douglas fir and cedar trees" (US Forest Service, 2023).

Exceptional ecological significance

The Skagit Chinook Salmon Recovery Plan states that Skagit River Basin, which includes the Cascade River, "represents the largest and one of the most unspoiled strongholds of fish and wildlife habitat in the Puget Sound" (Skagit River System Cooperative and WDFW, 2005).

The Cascade River supports several ecologically significant fish populations for which the Washington Department of Fish and Wildlife has identified as priorities for management and conservation. These species include threatened spring Chinook and threatened winter and summer steelhead, all of which spawn within the ORW boundary (WDFW, 2023a). Spring Chinook documented spawning occurs on the upper mainstem from Lower South Fork to below Marble Creek. The Skagit Chinook Salmon Recovery Plan notes that the Spring Chinook that spawn in the upper Cascade River are genetically distinct from all other Chinook populations in the Skagit Basin ((Skagit River System Cooperative and WDFW, 2005).

Documented spawning for federally threatened bull trout occurs in the South Fork and tributaries including Sonny Boy Creek, Kindy Creek, and Marble Creek. Fall chum, coho, sockeye, resident coastal cutthroat trout, and odd-year pink salmon are also documented in the Cascade River and its tributaries (WDFW, 2023a). Figure 13 shows the combined distribution of salmon, steelhead, and trout species within the ORW boundary for the Cascade River and tributaries from the Washington Department of Fish and Wildlife online interactive mapping database, SalmonScape.

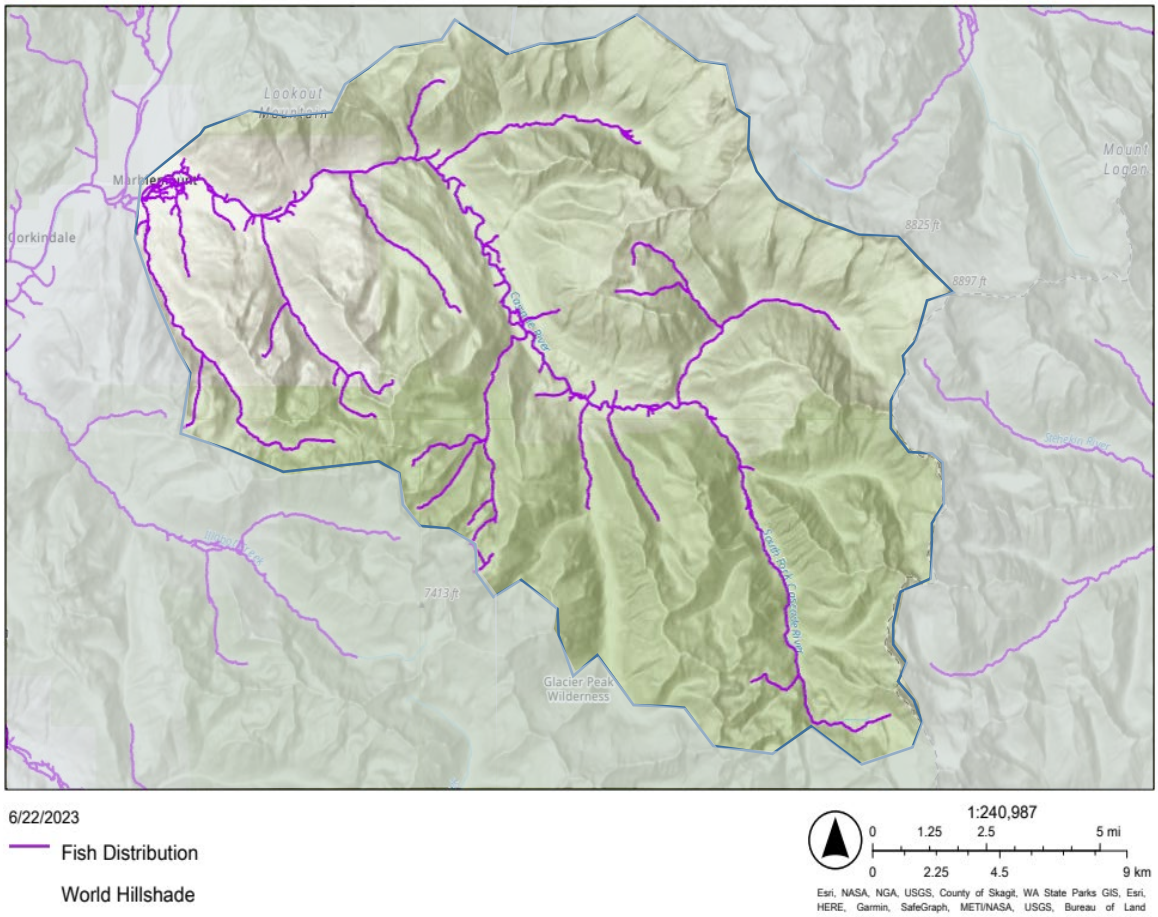

Figure 13 Combined extent of documented spawning, rearing, and presence of salmon, steelhead, and trout in the Cascade River and tributaries.

Other species of conservation concern identified within the ORW boundary include the state endangered northern spotted owl, state endangered lynx, state endangered grizzly bear, and wolverine. Priority habitat types of conservation concern that are found within the boundary include freshwater emergent wetland, freshwater forested/shrub wetland, and riverine habitat (WDFW, 2023b).

Water quality standards ORW designation

In consideration of the eligibility criteria and public comment received, Ecology has designated the Cascade River and tributaries upstream from the west boundary of Mount Baker Snoqualmie National Forest (48.5324, -121.3078) at the west section line of Section 07, Township 35 North, Range 12 East, to headwaters, as an outstanding resource water under Tier

III(A) protection in WAC 173-201A-332 Table 332 – Outstanding Resource Water designations by water resource inventory area (WRIA).

Tier III(A) protection means all new or expanded actions that would degrade water quality are prohibited. In setting this protection level, we recognize the existing relatively pristine condition and protections in place within the ORW boundary.

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Review of the Napeequa River for ORW Designation

Geography

The Napeequa River in Chelan County flows for 16 miles from the Butterfly Glacier in the Glacier Peak Wilderness into the White River, which flows into Lake Wenatchee. The river flows through a narrow and steep valley within the Cascade Range, with the White Mountains to the west and the Chiwawa Range to the east. The river was named for a Salishan word meaning "white water place," likely due to its silty appearance from glacial melt.

Rather unique among Washington's rivers, the majority of the Napeequa River is accessible only by trail. Only the last mile of river, before it meets the White River, flows through private developments.

Outstanding resource water boundary

We designated the Napeequa River in WRIA 45 – Wenatchee watershed, upstream from the boundary of the Okanogan-Wenatchee National Forest and private land near river mile 1 (47.9269, -120.8870) at Section 17, Township 28 North, Range 16 East, to headwaters, including tributaries (Figure 14). Major tributaries include Louis Creek and Lake Creek. The lowest one mile of the river flows through privately-owned land and is excluded from the ORW designation.

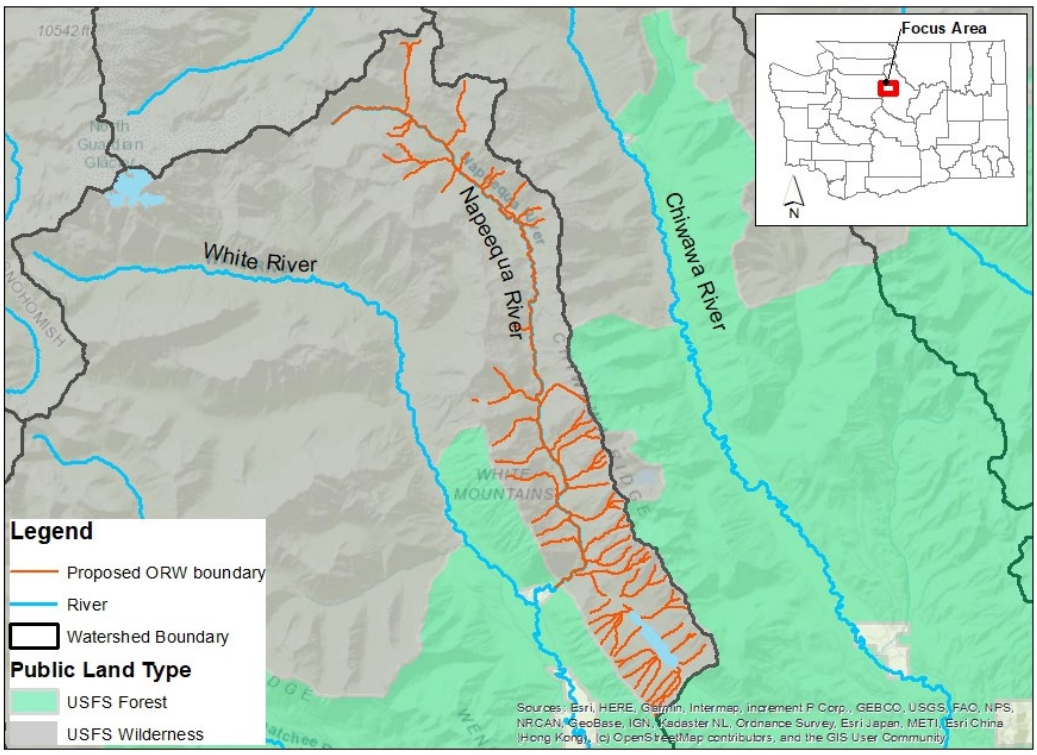

Figure 14 Outstanding resource water designation within the Napeequa River watershed

We include all named and unnamed tributaries to the Napeequa River within the ORW boundary. This is consistent with WAC 173-201A-260(3)(b), which states that "[u]pstream actions must be conducted in manners that meet downstream waterbody criteria.... the criteria associated with the most upstream uses designated for a water body are to be applied to headwaters to protect...the designated downstream uses." Including upstream tributaries is important to protect the river if pollution sources were to degrade water quality in upstream areas.

Existing designations and land use

US Forest Service Designations

The majority of the ORW boundary is within the Glacier Peak Wilderness Area. A small section of approximately 400 meters of river at the downstream boundary is within the Okanogan-Wenatchee National Forest. Access to the river within the wilderness area is by trail only. Appendix A provides a comparison of how land and water is protected by Wild and Scenic Rivers, Wilderness designation, and Outstanding Resource Waters.

Wild and Scenic River designation

The Napeequa River has been recognized as "eligible" for Wild and Scenic River designation, though it has not been formally designated. To reach "eligible" recognition, the Napeequa River was evaluated by an interdisciplinary team of natural resource specialists to determine if the river possessed "outstandingly remarkable values" that are attributed to Wild and Scenic rivers. The evaluation concluded that the river possessed outstandingly remarkable scenic and geologic values. The assessment of the Napeequa's scenery is described in the Wenatchee National Forest Wild and Scenic River Analysis, an appendix to the 1990 Wenatchee National Forest Plan (USDA, 1990):

> The Napeequa River is noted for its outstanding scenery. The river flows through a high elevation glacial trough that eventually narrows to a steep, talus-walled valley. Towering mountain peaks, impressive alpine glaciers, extensive snowfields, rugged granitic outcrops, and a vegetative cover marked by scattered old growth, hardwoods, and interspersed meadow openings, characterize the corridor. The watercourse tumbles through this valley in a series of waterfalls, cascades and slow meanders.

Until the river is determined suitable for formal designation under the National Wild and Scenic Rivers Act, the river's scenic and geologic values are protected on national forest land.

Protection from hydroelectric development

The Northwest Power and Conservation Council has designated areas within the ORW boundary as protected from hydroelectric development (Northwest Power and Conservation Council, 2023). This means that the Federal Energy Regulatory Commission must consider protected areas before granting licenses for a new hydroelectric facility.

Water quality

While water quality data is not available for the Napeequa River, the river within the ORW boundary is located within a remote valley that is free from human development. The river originates at the Butterfly Glacier, and glacial silt contributes the river's white color. There are no permitted discharges along the river. Given the lack of development and minimal human disturbance within the boundary, the Napeequa River provides relatively pristine water with no perceived human-caused impairments.

Outstanding Resource Water attributes

The Napeequa River meets the following eligibility criteria as an outstanding resource water in WAC 173-201A-330(1):

- The water is in a relatively pristine condition (largely absent human sources of degradation) or possesses exceptional water quality, and also occurs in federal and state parks, monuments, preserves, wildlife refuges, wilderness areas, marine sanctuaries, estuarine research reserves, or wild and scenic rivers;
- The water has both high water quality and regionally unique recreational value; and
- The water is of exceptional statewide ecological significance.

Relatively pristine condition and in a protected area

The boundary of the Napeequa River outstanding resource water designation is entirely absent of human development, thus the river is considered in relatively pristine condition. No permitted outfalls are located within the boundary. Given that all but 400 meters of river is within the Glacier Peak Wilderness Area, the majority of the boundary meets this eligibility criteria.

High water quality and regionally unique recreational value

The Napeequa River valley has no sources of human caused water quality impairments. The river is free-flowing and within undegraded wilderness area. These conditions indicate that the waterbody has high water quality within the ORW boundary.

The Napeequa River Valley is renowned for its unique recreational value. The Mountaineers organization describes the Napeequa River Valley as one of the most "revered and wildest valleys in the state" (The Mountaineers, 2023). Washington Trails Association likewise notes the valley is "as deep as it is isolated, as lush and green and it is wild" (Washington Trails Association, 2011).

The Napeequa River Trail that follows the river can only be accessed by other high pass trails with a minimum of eight miles in length and over 4,000 feet in elevation gain (Washington Trails Association, 2023). Due to the remoteness of the trails accessing the river valley, the Napeequa offers an unparalleled opportunity for hikers to experience remarkable scenery in relative solitude.

Exceptional ecological significance

The relatively pristine valley and remarkable scenery make the Napeequa River an exceptional ecological resource for the state of Washington. The river supports spawning habitat for anadromous fish such as sockeye and spring Chinook. Other documented fish presence includes Westslope cutthroat, rainbow trout, mountain whitefish, and bull trout (WDFWa, 2023).

The remote valley also provides habitat for several species for which the Washington Department of Fish and Wildlife has identified as priorities for management and conservation. These species include the federally threatened northern spotted owl, wolverine (Endangered Species Act candidate for listing), mule deer, federally threatened lynx, and gray wolf (WDFW, 2023b).

Water quality standards designation

In consideration of the eligibility criteria and public comment received, Ecology has designated the Napeequa River and tributaries upstream from the boundary of the Okanogan-Wenatchee National Forest and private land near river mile 1 (47.9269, -120.8870) at Section 17, Township 28 North, Range 16 East, to headwaters, as an outstanding resource water under Tier III(A) protection in WAC 173-201A-332 Table 332 – Outstanding Resource Water designations by water resource inventory area (WRIA).

Tier III(A) protection means all new or expanded actions that would degrade water quality are prohibited. In setting this protection level, we recognize the existing relatively pristine condition and protections in place within the ORW boundary.

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Review of the Green River for ORW Designation

Geography and History

The Green River is part of the Cowlitz River basin and flows through the original homelands of the Confederated Tribes and Bands of the Yakama Nation and the Cowlitz Indian Tribe. The headwaters begin near Spirit Lake in the Mount St. Helens National Volcanic Monument, in Skamania County. The river flows west for approximately 37 miles through the National Volcanic Monument, Gifford Pinchot National Forest, and privately-owned timberlands in Skamania, Lewis, and Cowlitz counties, before meeting the North Fork Toutle River (Figure 15). The North Fork Toutle River drains to the Cowlitz River.

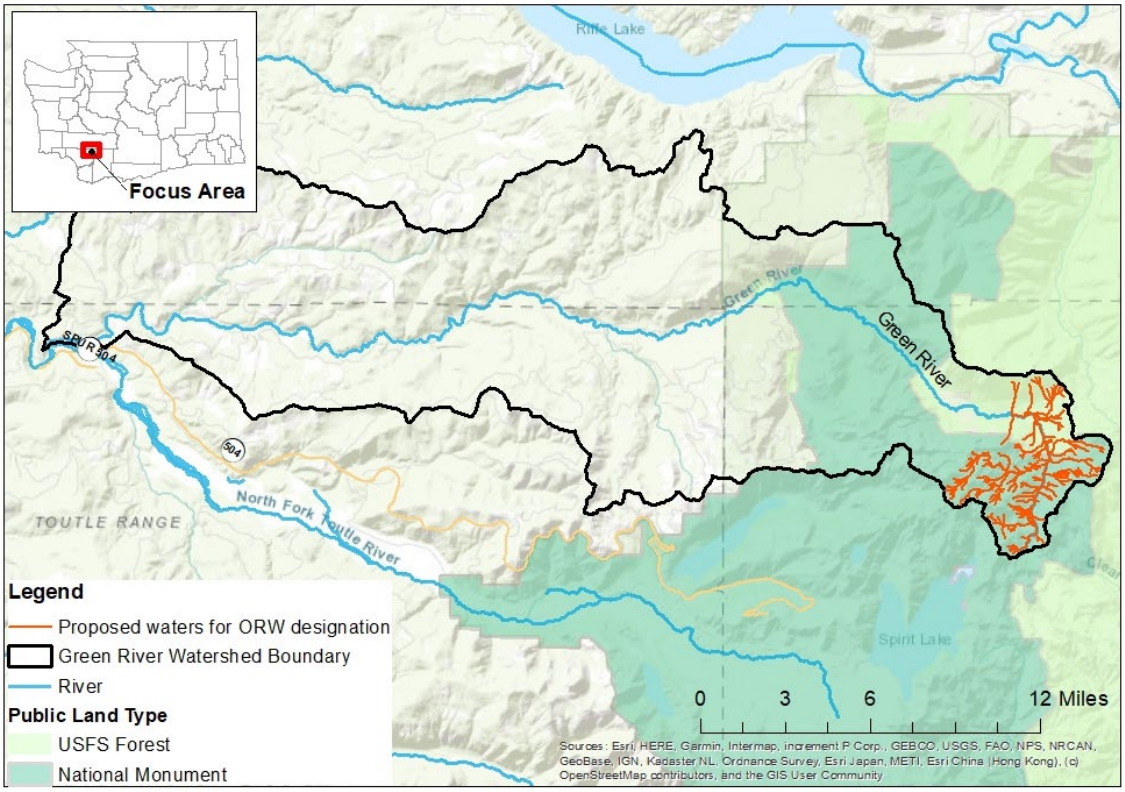

Figure 15 Outstanding resource water designation within the Green River watershed

The Green River Valley was likely shaped by glacial scour from nearby Mount St. Helens and other mountains (Bureau of Land Management, 2012). As part of the Cowlitz River watershed, the Green River is a source of drinking water for the community of Kelso, which draws water from a groundwater well on the banks of the Cowlitz River (City of Kelso, 2021).

The Green River is an exceptionally unique waterbody in Washington. Flowing along the outer region of the blast zone, the Green River and surrounding region were significantly impacted by the 1980 eruption of Mount St. Helens (Figure 16). The effects of the eruption on the ecosystem surrounding the river varied. Some regions along the river experienced forest blow downs, while other sections were left with scorched standing trees. Still other areas of the river

flow through old growth habitat that remained untouched from the eruption. The Green River provides an extremely unique opportunity for scientists studying the ecological processes of recovery from an eruption, and for the public to learn about and recreate in such a singular landscape.

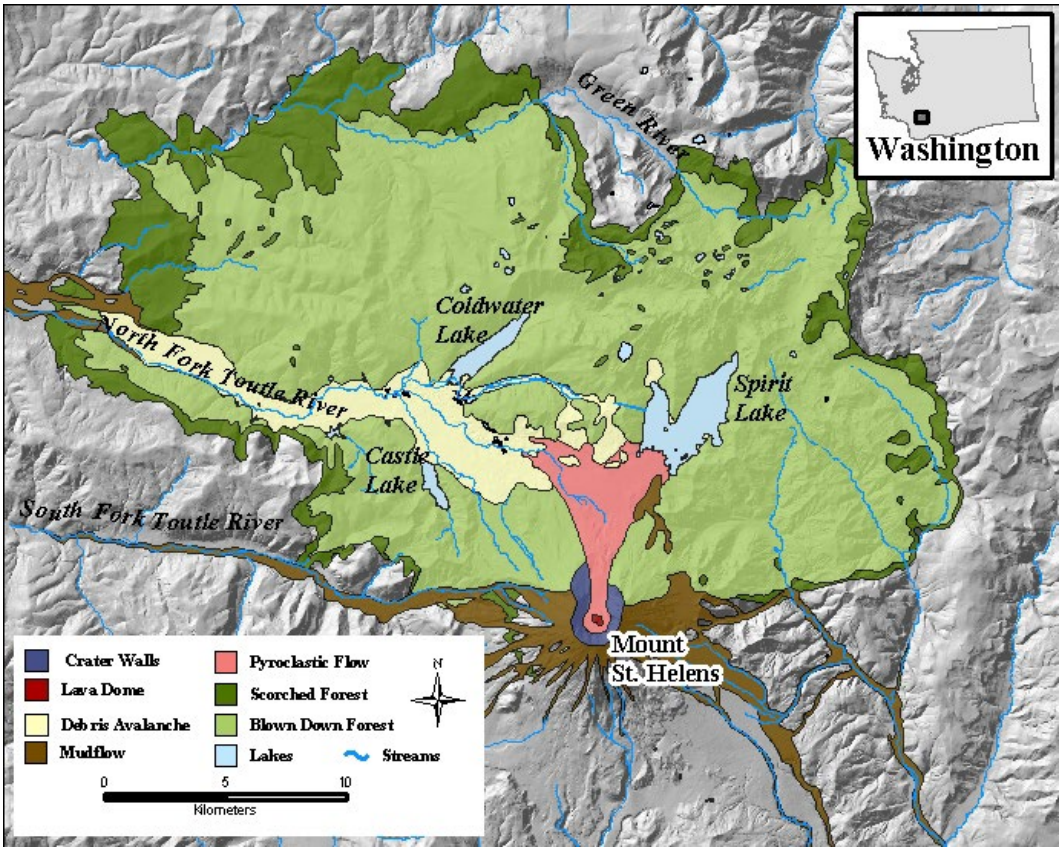

Figure 16 Disturbance zones created by Mount St. Helens eruption (Image source: US Forest Service)

The Green River is located within the St Helens Mining District, which was historically mined for copper, gold, and silver, beginning in the early 1900s. Exploratory drilling for copper mining occurred in the region as recent as the 1970s, but those efforts were abandoned following the eruption of Mount St. Helens. In 2018, the US Forest Service and Bureau of Land Management granted a permit for exploratory drilling for copper, gold, and molybdenum near the headwaters of the Green River. However, the authorization to conduct the exploratory drilling was challenged in court due, in part, to the inadequate environmental assessment of potential impacts to groundwater. In early 2022, a US District Court cancelled the authorization of the permit (Fairbanks, 2022). No current mining operations occur within the proposed boundary.

Proposed outstanding resource water boundary

We designated the Green River in WRIA 26 – Cowlitz watershed upstream from the boundary of the Gifford Pinchot National Forest (46.3484, -122.0938) at the west section line of Section 17, Township 10 North, Range 06 East, to headwaters, including tributaries (Figure 17). This

boundary is based on a revision requested by the proponents. An earlier nomination boundary inadvertently included reaches of river that flow through a large section of privately-owned land.

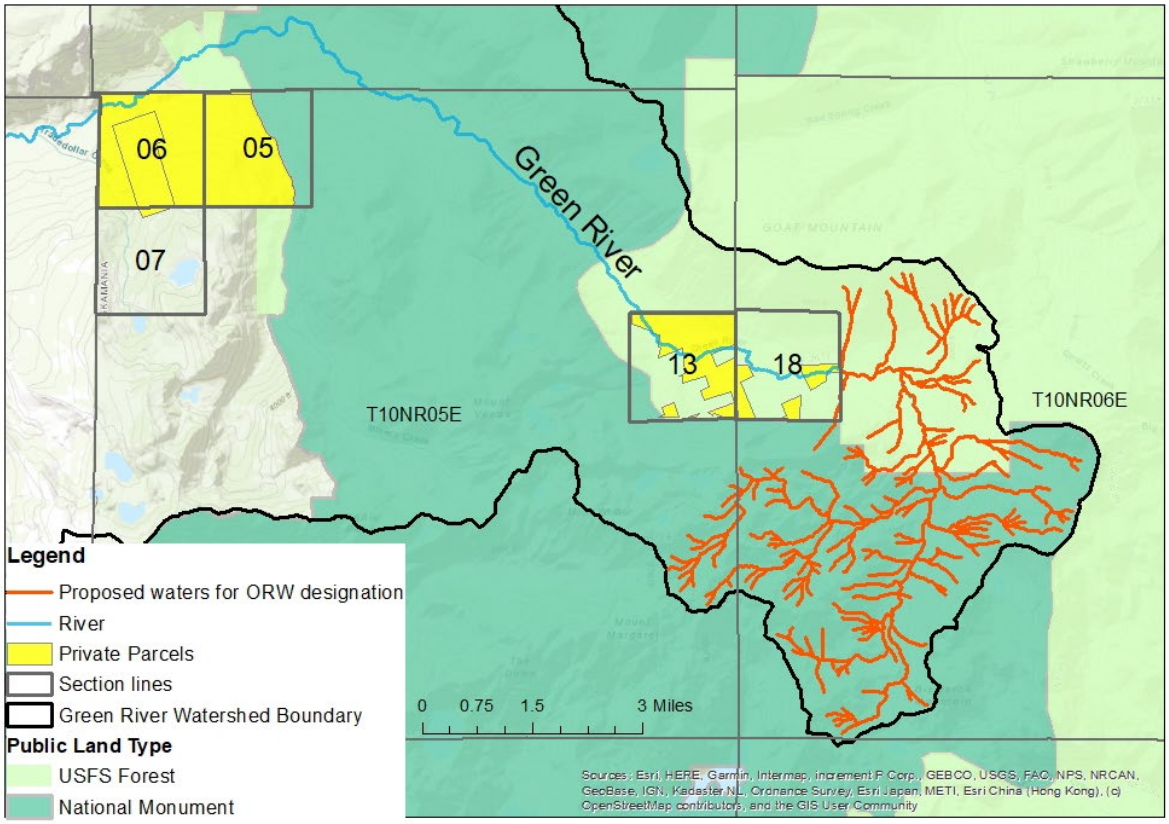

Figure 17 Scaled view of outstanding resource waters designation within the Green River watershed.

We include all named and unnamed tributaries to the Green River within the ORW boundary. This is consistent with WAC 173-201A-260(3)(b), which states that "[u]pstream actions must be conducted in manners that meet downstream waterbody criteria…. the criteria associated with the most upstream uses designated for a water body are to be applied to headwaters to protect... the designated downstream uses." Including upstream tributaries is important to protect the river if pollution sources were to degrade water quality in upstream areas.

Existing designations and land use

Mount St. Helens National Volcanic Monument

The headwaters of the Green River begin in the Mount St. Helens National Volcanic Monument within the Gifford Pinchot National Forest and is managed by the US Forest Service. This monument was established following the 1980 eruption of Mount St. Helens for research, recreation, and education. The majority of the ORW mainstem river segments and tributaries fall within the national monument.

Land use and designations within the Gifford Pinchot National Forest

Outside the national monument, the Northwest Forest Plan has allocated land within the ORW boundary as matrix, which describe federal lands outside of reserved allocations where most timber harvest and silvicultural activities may occur and includes forested areas that may be unsuitable for timber harvest (US Forest Service, 1994). However, some land within this area was purchased by the US Forest Service using Land and Water Conservation funds, which are appropriated for conservation and recreation, with the purpose of preserving the integrity of the Green River.

Further, the Forest Service has designated the riparian areas along the Green River as riparian reserves, which are designed to maintain aquatic ecosystem functions and water quality standards. For fish-bearing streams, riparian reserves are set to equal the height of two site-potential trees or 300 feet slope distance, whichever is greater. For non-fish bearing streams, riparian reserves are set at one site-potential tree height, or 150 feet slope distance, whichever is greater (US Forest Service, 1994).

Inventoried Roadless Areas

The headwaters of three tributaries within the ORW boundary fall within the Tumwater Inventoried Roadless Area. Roadless areas were originally identified as part of a Forest Service Roadless Area Review and Evaluation conducted in the 1970s for areas of undeveloped land larger than 5,000 acres, with the intent to designate wilderness or other management directions (US Forest Service, 1979). Protections in Roadless Areas were established through the 2001 Roadless Area Conservation Rule, which identifies roadless areas as having properties such as high quality or undisturbed soils, water, and air, sources of public drinking water, or primitive, semi-primitive, non-motorized and semi-primitive motorized classes of dispersed recreation (Special Area; Roadless Area Conservation, 2001). The 2001 Roadless Area Conservation Rule sets limits on road construction, reconstruction, and timber harvest.

Wild and Scenic River designation

Portions of the Green River have been recognized as “eligible” for Wild and Scenic River designation according to the National Parks Service Nationwide Rivers Inventory, though the river has not been formally designated. This eligibility is based on the river possessing outstandingly remarkable geologic, historic, recreational, and scenic values. In its assessment of the Green River, Nationwide Rivers Inventory highlights the “opportunities for interpretation of [the] 1980 eruption” (National Parks Service, 2016). The eligible sections of the river fall within the ORW boundary. Until the river is determined suitable for formal designation under the National Wild and Scenic Rivers Act, the river’s geologic, historic, recreational, and scenic values are protected on national forest land.

Appendix A provides a comparison of how land and water is protected by Wild and Scenic Rivers, Wilderness designation, and Outstanding Resource Waters.

Shoreline of statewide significance

The Green River is a shoreline of statewide significance beginning at the boundary of the Gifford Pinchot National Forest downstream to the Cowlitz-Skamania County line. Rivers with a mean annual flow of at least 1,000 cubic feet per second are considered shorelines of statewide significance.

Protection from hydroelectric development

The Northwest Power and Conservation Council has designated the Green River and associated wildlife within the proposed boundary as protected from hydroelectric development. This means that the Federal Energy Regulatory Commission must consider protected areas and impacts to wildlife before granting licenses for a new hydroelectric facility (Northwest Power and Conservation Council, 2021).

Water quality

No water flow gauges are located within the ORW boundary; however, a staff gauge is located about 4.5 river miles upstream of the confluence with the North Fork of the Toutle River. Average of monthly mean flow volume ranged from 272 cubic feet per second in September to 1,130 cubic feet per second in February (US Geological Survey, 2023).

A 2010 Integrated Watershed Assessment of the Toutle River subbasin notes that while much of the water quality in the Toutle River watershed is impacted by runoff due to immature forest stands and a high density of roads, the headwaters of the Green River is the only subwatershed identified as having a "functional" hydrological and riparian condition rating (Lower Columbia Fish Recovery Board, 2010a).

The hydrologic condition of the upper Green River watershed was assessed based on factors such as the degree of impervious surfaces, land cover, and road density. These factors can effect in-stream habitat quality and quantity for aquatic species. Likewise, riparian condition is a way to measure processes such as nutrient cycling and stream temperature, and a "functional" rating indicates an intact riparian zone based on riparian buffer width for different categories of vegetation (Lower Columbia River Fish Recovery Board, 2010b).

Water Quality Impairments

An unnamed tributary to the Green River upstream of the Green River Horse Camp is listed as Category 5 for copper. Category 5 means we have data showing that the water quality standards have been violated for one or more pollutants, and there is not a pollution control program in place. This Category 5 listing was made as result of a single sample taken in 2001 near a copper mine adit, which is a horizontal passage into an underground mine for access or drainage, that exceeded the acute and chronic water quality standards criteria for copper (Washington Department of Ecology, 2002). This listing has been carried over from a previous water quality assessment cycle due to the lack of data to make an updated determination.

A 0.6-mile section of the mainstem Green River near the Green River Horse Camp is listed as Category 2 for pH. Category 2 means there is some evidence of a water quality problem, but

not enough to show persistent impairment. This listing is based on a single sample taken in 2000 that exceeded the water quality standards criteria for pH.

Downstream and outside of the ORW boundary, a section of the Green River is listed as Category 5 for temperature on the mainstem in Cowlitz County downstream of Tradedollar Creek, and on sections of Shultz Creek, a tributary of the Green River also in Cowlitz County. High temperatures are, in part, attributed to effects of the Mount St. Helens eruption (Lower Columbia Fish Recovery Board, 2010).

No point source discharges are located within the ORW boundary.

Outstanding Resource Water attributes

The Green River meets the following eligibility criteria as an outstanding resource water in WAC 173-201A-330(1):

- The water is in a relatively pristine condition (largely absent human sources of degradation) or possesses exceptional water quality, and also occurs in federal and state parks, monuments, preserves, wildlife refuges, wilderness areas, marine sanctuaries, estuarine research reserves, or wild and scenic rivers;
- The water has both high water quality and regionally unique recreational value; and
- The water is of exceptional statewide ecological significance.

Relatively pristine condition and in a protected area

The upper Green River watershed has experienced little human disturbance, and the majority of the ORW boundary is protected within the Mount St. Helens National Volcanic Monument. Therefore, this segment of the watershed meets this eligibility criteria.

High water quality and regionally unique recreational value

Outside the national monument, Ecology designated a segment of the river and tributaries due to the high water quality and recreational value of the area.

Though the river may show some impairment due to historic mining activities, the headwaters of the Green River have a functional hydrologic and riparian rating, indicating that the conditions of the upper watershed are relatively undegraded.

Recreational opportunities include the popular Green River Trail which takes hikers through a variety of disturbance zones from the 1980 eruption, including stands of trees that were scorched by the blast but remained standing, replanted forest that was blown down, and old-growth forest that remained untouched by the eruption, referred to as the “Valley of the Giants.” The area is also popular for camping, mountain biking and horseback riding and includes the Green River Horse Camp.

Exceptional ecological significance

The Green River and surrounding landscape contain exceptional ecological features unique to Washington and nationally. The diversity in how the landscape was affected by the eruption resulted in a uniquely dynamic landscape in recovery. The region has become a living laboratory for scientists to study these unique processes (Bendixen, 2021).

As the only subwatershed in the Toutle River basin with a functional hydrological and riparian rating, the headwaters of the Green River provides important habitat for aquatic species (Lower Columbia Fish Recovery Board, 2010a). The Washington Department of Fish and Wildlife Priority Habitats and Species list has identified several species within this area as priorities for management and conservation. Fall Chinook and winter steelhead spawn in the Green River, though most spawning occurs in the lower sections of river (WDFW, 2023). Within the ORW boundary, there is documented presence of cutthroat trout and summer steelhead (WDFW, 2023a).

In 2015, the Green River, along with the North Fork Toutle River, was designated as a wild steelhead gene bank by WDFW. A wild steelhead gene bank designation means that WDFW no longer releases hatchery fish into the river in order to support the survival of wild populations. The Green River was chosen for this designation because the river supports the majority of the North Fork Toutle River steelhead population, the river habitat was determined to be in good condition, and the difficulty in harvesting hatchery steelhead in the upper Green River due to limited public access (WDFW, 2013).

In addition to aquatic species, the Green River within the ORW boundary supports habitat for the federally threatened northern spotted owl. This area also includes priority habitats including freshwater forested/shrub wetlands, freshwater emergent wetlands, and riverine habitats (WDFW, 2023b).

Water quality standards ORW designation

In consideration of the eligibility criteria and public comment received, Ecology has designated the Green River and tributaries upstream from the boundary of the Gifford Pinchot National Forest (46.3484, -122.0938) at the west section line of Section 17, Township 10 North, Range 06 East, to headwaters, including tributaries, as an outstanding resource water under Tier III(A) protection in WAC 173-201A-332 Table 332 – Outstanding Resource Water designations by water resource inventory area (WRIA).

Tier III(A) protection means all new or expanded actions that would degrade water quality are prohibited. In setting this protection level, we recognize the limited human-caused degradation within much of the designation boundary, the protections in place within the national monument, and the conservation measures in place through existing riparian reserves managed by the US Forest Service within the ORW boundary.

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Appendix A Comparison of Protections

Comparison of three federal acts designed to protect natural resources.

	Wild and Scenic Rivers	Wilderness designation	Outstanding Resource Water under Federal Clean Water Act
Purpose of these federal regulations	The Wild and Scenic Rivers Act was enacted in 1968. The Goal is to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition.	Part of the 1964 Wilderness Act. The Goal is to establish a National Wilderness Preservation System to provide for the protection of undeveloped and natural areas to ensure that future generations can experience and enjoy pristine landscapes.	The 1972 Clean Water Act (CWA). One of the Antidegradation Goals is to provide provisions for the protection of special water resources known as Outstanding Resource Waters. These waters are designated due to their exceptional ecological, recreational, or aesthetic significance.
What are the criteria for designating these areas	Rivers can be designated as wild, scenic, or recreational based on their outstanding values. Wild rivers are generally inaccessible except by trail, scenic rivers are free of impoundments with largely undeveloped shores, and recreational rivers may have some impoundments or development	Wilderness areas must possess qualities of solitude, naturalness, and freedom from human disturbance. These areas are typically large and are managed to preserve their wild character.	ORWs are identified based on their outstanding qualities and may include waters that are critical for fisheries, drinking water supplies, or provide unique recreational opportunities. State adopted water quality standards are required to provide more detail on how ORWs are designated.

	Wild and Scenic Rivers	Wilderness designation	Outstanding Resource Water under Federal Clean Water Act
What is protected	Designation prohibits the construction of new dams or other water development projects that would harm the river's free-flowing condition.	Wilderness areas are protected from activities that would significantly impact their natural condition, such as logging, mining, and motorized vehicle use	States are required to adopt water quality standards that protect ORWs. These standards may include more stringent criteria for pollutants to ensure the preservation of the exceptional qualities of these waters. To protect the waters and downstream uses.
Agency that implements	The Wild and Scenic Rivers program is primarily implemented by the National Park Service (NPS), the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS).	Wilderness areas are managed by different federal agencies, depending on where the land is located, and which federal agency manages that land. This can include: the National Park Service, U.S. Forest Service, Bureau of Land Management, and the U.S. Fish and Wildlife Service.	The Clean Water Act is a federal law, but its implementation is a shared responsibility between federal, state, and tribal governments. States play a key role in implementing the Clean Water Act, including the designation and protection of Outstanding Resource Waters.

	Wild and Scenic Rivers	Wilderness designation	Outstanding Resource Water under Federal Clean Water Act
How are these waters protected?	Once a river is designated as Wild and Scenic, the managing agency is responsible for enforcing the protections outlined in the designation. This can involve working with local communities, conducting environmental assessments, and monitoring activities along the river to ensure they comply with the Wild and Scenic Rivers Act	The managing agencies are responsible for enforcing regulations within wilderness areas. This involves activities such as patrolling, monitoring visitor activities, and educating the public on Leave No Trace principles. Violations can lead to citations and fines.	State environmental agencies are typically responsible for enforcing water quality standards, including those related to ORWs. Enforcement mechanisms can include permits, regulatory actions, fines, and legal measures against entities that violate water quality standards.